LAUDA

# Operating instructions

## LAUDA VISCOCOOL 6

Viscothermostat with Peltier cooling and
ECO SILVER control head

**LCD 0292**

# Original Operating Instructions

## VISCOCOOL 6

Viscothermostat with Peltier cooling and ECO SILVER control head

English
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YAME0024

Valid from:
Software of control system from version 1.36
Software of protection system from version 1.36
Software of cooling system from version 1.31

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# 1 Safety

## 1.1 Safety information

| Type and source |
| --- |
| *Consequences of non-compliance* |
| • Action 1<br>• Action ... |

**"DANGER"** indicates an immediate dangerous situation which – if the safety requirements are ignored – may result in fatal or severe, irreversible injuries.

| Type and source |
| --- |
| *Consequences of non-compliance* |
| • Action 1<br>• Action ... |

**"WARNING"** indicates a possible dangerous situation which – if the safety requirements are ignored – may result in fatal or severe, irreversible injuries.

| Type and source |
| --- |
| *Consequences of non-compliance* |
| • Action 1<br>• Action ... |

**"CAUTION"** indicates a possible dangerous situation which – if the safety requirements are ignored – may result in slight, reversible injuries.

Notice

| Type and source |
| --- |
| *Consequences of non-compliance* |
| • Action 1<br>• Action ... |

**"NOTICE"** warns of possible property or environmental damage.

⇨ Reference Refers to further information in other sections.

## 1.2 General safety

Read through the operating instructions carefully. They contain important information for working with this device. If you have any queries, please contact our Service Department (⇨ 8.7).

Follow all the directions in these operating instructions. Only in this way is the correct procedure ensured when working with the device.

- Make sure that the device is only operated by instructed specialist personnel.
- Never operate the device without heat transfer liquid (water).
- Never operate the device if
  - ...if it is damaged,
  - ...if it is leaking,
  - ...if the mains cable is damaged.
- Switch off the device and withdraw the mains plug
  - ...when carrying out service or repair work,
  - ...when moving the device,
  - ...when installing or removing modules or accessories,
  - ...in case of danger.
- Do not make technical modifications to the device. Infringements in this respect invalidate the warranty.
- Have service and repair work carried out only by specialists.
- Follow the safety information in the following sections and read it through carefully.

Classes in the EMC standard DIN EN 61326-1.
Class A: Operation only on electrical supply networks without connected domestic areas.
Class B: Equipment for operation on electrical supply networks with connected domestic areas.
With unfavorable network conditions interfering voltage variations can occur.

EMC standard DIN EN 61326-1 (corresponds to VDE 0843-20-1)

| | |
|---|---|
| Device for Europe | Class B |
| Device for Canada and the USA | Class A |

**Usage restriction**

For the EMC standard DIN EN 61326-1:

Devices in **Class A** are only to be operated on electrical supply networks without connected domestic areas.

## 1.3 Special safety information

The use of the thermostat is only admissible under the following conditions:

- The siting surface must be impervious, flat, non-slip and non-combustible. Do not position the thermostat at the edge of the bench or table.
- Keep to the specified wall spacing (⇨ 6.1).
- Protect the device from dripping or condensing water.
- Do not store any liquids or combustible objects above the device.
- Do not work with flammable liquids in the direct vicinity of the device.
- Only connect the device to an earthed mains socket which is freely accessible.
- At higher operating temperatures parts of the bath cover can take on surface temperatures of over 70 °C. There is a danger of burns.
- Make sure that ventilation openings are not covered nor closed.
- Set the overtemperature switch-off point according to the heat transfer liquid used.
- Have repairs carried out only by specialists.
- Keep to all the service and maintenance intervals according to VDI 3033 (⇨ 8.3.2).
- Take note of all safety labels.

# 2 General remarks

## 2.1 Description of the device

This device is a Viscothermostat with Peltier cooling and transparent bath and is specially designed for applications of capillary viscometry close to room temperature. In this respect it involves a cooling, heating bath thermostat, also designated as a cooling thermostat in the following. It is used for cooling/ heating liquids.

The device is constructed as a double-chamber system. A well-proven ECO SILVER control head is located on the basic device with integral Peltier unit. This arrangement ensures very good control constancy and very high homogeneity in the bath liquid with constant liquid level.

## 2.2 Intended application

This LAUDA thermostat is manufactured exclusively for cooling/heating water in the viscosity measurement room.

The devices must only be operated as intended and under the conditions stated in these operating instructions. Any other operating mode is not regarded as intended use.

- The device may only be put into operation in suitable interior rooms.
- Operation up to a height of only 2000m above sea level is admissible.
- Operation is only allowed under the defined conditions (⇨ 10).

## 2.3 Use other than that intended

The device must not be used:

- for medical applications.
- in areas subject to explosion hazards.
- when sited outdoors.
- with non-aqueous liquids.
- for heating or cooling foodstuffs.

## 2.4 Responsibility of the operating body - safety information

The operating body is responsible for the qualifications of the operating personnel.

- The thermostat must only be configured, installed, maintained and repaired by specialist personnel.
- Persons operating the device must be instructed in their work by a specialist.
- Make sure that specialist personnel and operators have read and understood the operating instructions.
- The device must be used as intended (⇨ 2.2).

## 2.5 EC conformity

CE

The device conforms to the relevant fundamental requirements for safety and health of the following listed directives:

- Low Voltage Directive 2006/95/EC.
- EMC Directive 2004/108/EC.
- Safety requirements for electrical equipment for measurement, control and laboratory use DIN EN 61010-1

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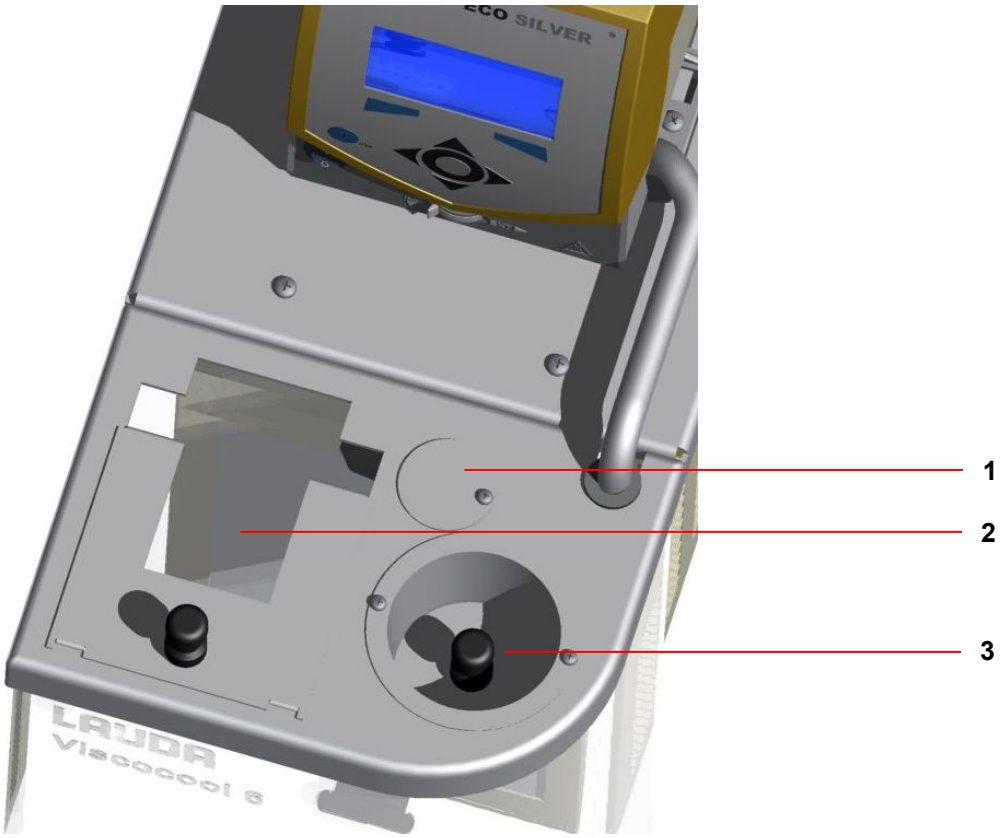
# 3 Device description

1 ECO SILVER Control Head
2 Nozzle pipe
3 Grip
4 Cover plate
5 Connection points (poorly visible)
6 Lower section of device
7 Bath vessel

**Openings in the cover plate**




1 temperature probe

2 automatic measuring point (iVisc; Stand S5)

3 manual measuring point; temperature prestabilization point

## 3.1 Pump

The device is equipped with a pressure pump. The pump provides a uniform flow through the bath vessel and also good transfer of the heat and cooling output to the bath medium.

Using the operating menu, one of six flow-rate levels can be selected for the pump.

Pump characteristics (⇨ 10)

## 3.2 Programmer

The devices are equipped with a programming function (⇨ 15).

## 3.3 Interfaces

In the basic version the devices are equipped with a mini-USB interface. This enables, for example, the connection of a PC and operation with the thermostat control software Wintherm Plus. In addition software updates are possible via the USB interface. The connecting lead is not included in the items supplied with the thermostat. When connecting up, make sure the correct plug is used.

## 3.4 Interface modules (Accessories)

The devices can be supplemented with further interface modules which are connected to the rear of the control head in two module slots (⇨ 17) and are inserted.

The following modules are currently available:

1. **Analog Module** (LAUDA order no. LRZ 912) with two inputs and two outputs on a six-pole DIN socket. The inputs and outputs can be set independently of one another as a 4...20 mA or 0...10 V interface. 20 V is brought out on the socket as a power supply for an external sensor with evaluation electronics.

2. **RS 232/485 Interface Module** (LAUDA order no. LRZ 913) with nine-pole SUB-D socket. Electrically isolated using optocouplers. The RS 232 interface can be connected directly to the PC using a 1:1 contacted cable (LAUDA order no. EKS 037).

3. **Analog Module** (LAUDA order no. LRZ 914) with connector to NAMUR NE28. Range of functions as for LRZ 915, but only one output and one input on each of two DIN sockets. Coupling socket 3-pole, (LAUDA order EQD 047) and coupling plug 3-pole, (LAUDA order no. EQS 048).

4. **Analog Module** (LAUDA order no. LRZ 915) with 15-pole SUB-D socket. With three relay contact outputs (changeover, max. 30V/0.2A) and three binary inputs for control via external voltage-free contacts. Socket 15-pole, (LAUDA order no. EQM 030) and connector shell (LAUDA order no. EQG 017).

5. **Profibus Module** (LAUDA order no. LRZ 917). You will find further information in the Operating Instructions YAAD0020 for the Profibus Module.

6. **Pt100/LiBus Module** (LAUDA Best. no. LRZ 918).

   **External Pt100**: For the connection of an external temperature sensor.

   **LiBus**: For the connection of the Command remote control unit from the Proline equipment line and other accessories, such as a solenoid valve for cooling water control, a reverse-flow protection device or a through-flow cooler (DLK) with LiBus connection.

## 3.5 Chiller

The chiller mainly consists of thermoelectric modules. The heat dissipation takes place through an aluminum heat sink with flange-connected ventilator fan. To achieve this, fresh air is drawn in at the device sides and discharged at the back. To ensure proper air circulation the ventilation openings must not be covered up.

The cold is discharged directly to the bath medium as it flows through a heat sink.

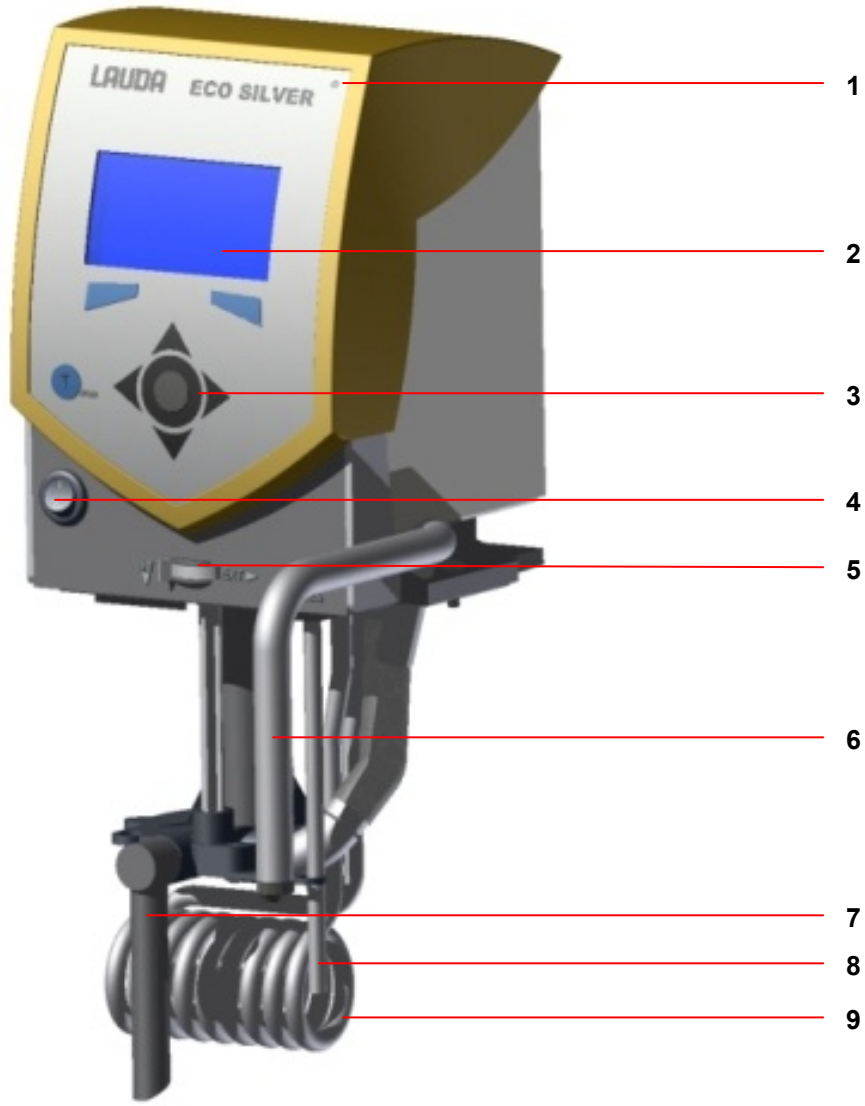
The chiller is normally switched in automatically, but can also be switched in manually via the operating menu (⇨ 17).

Cooling times can be found in the cooling curves (⇨ 10).

# 4 Operating and functional controls

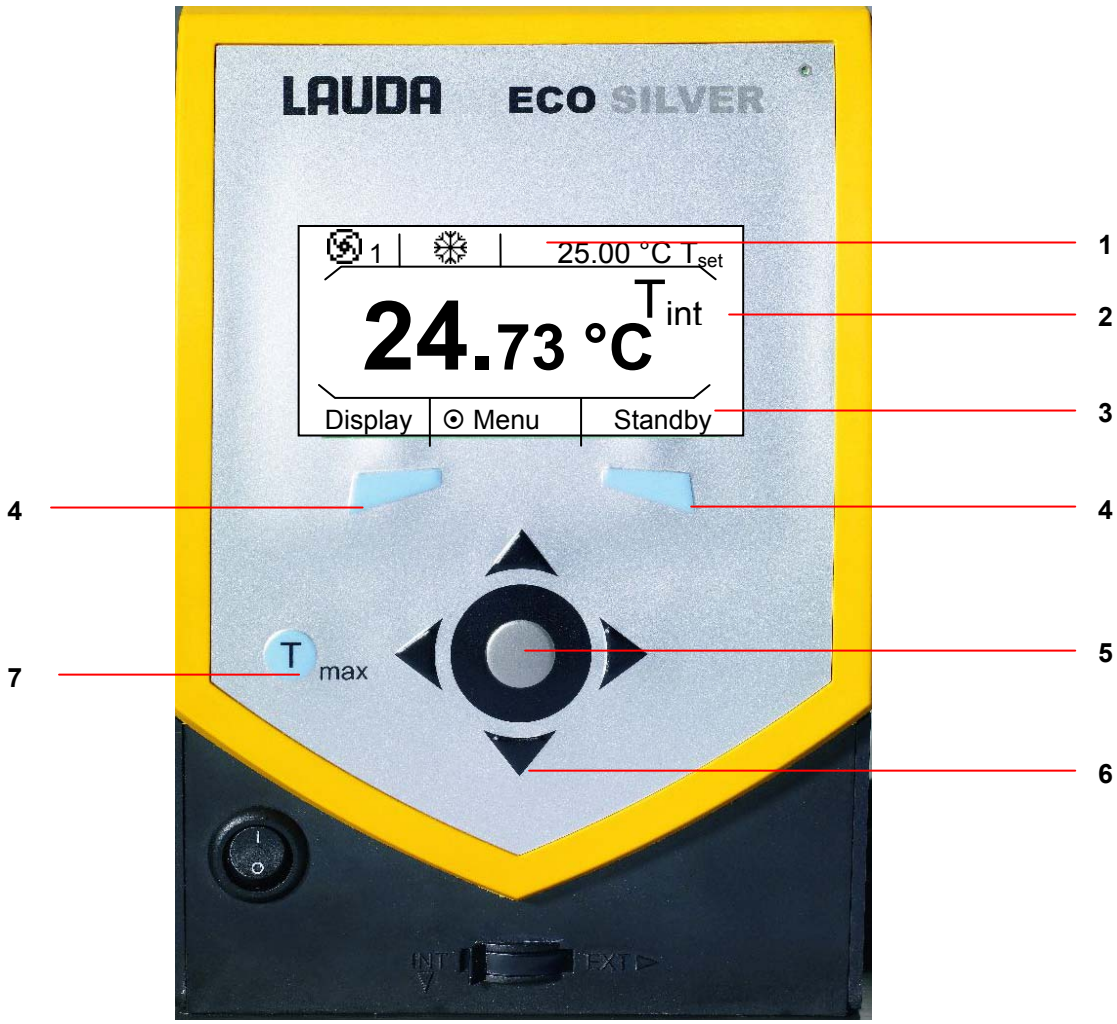
The following pages illustrate the ECO SILVER control head and the control panel.

**ECO SILVER control head** (modified for Viscocool)




1 Light sensor for automatic control of display brightness
2 Monochrome LCD display
3 Control panel (refer to following page)
4 Mains switch
5 Selector switch for dividing up the external and internal pump flow
6 Nozzle pipe
7 Pressure nozzle
8 Pt100 temperature sensor
9 Heater

**Control panel and display ECO SILVER**




**Display**

1 Status display

2 Display of the internal or external temperature value ($T_{int}$ or $T_{ext}$)

3 Soft-key bar

**Control panel**

4 Soft keys, left and right

5 Enter key

6 Arrow keys (cursor keys) for Up, Down, Left and Right.

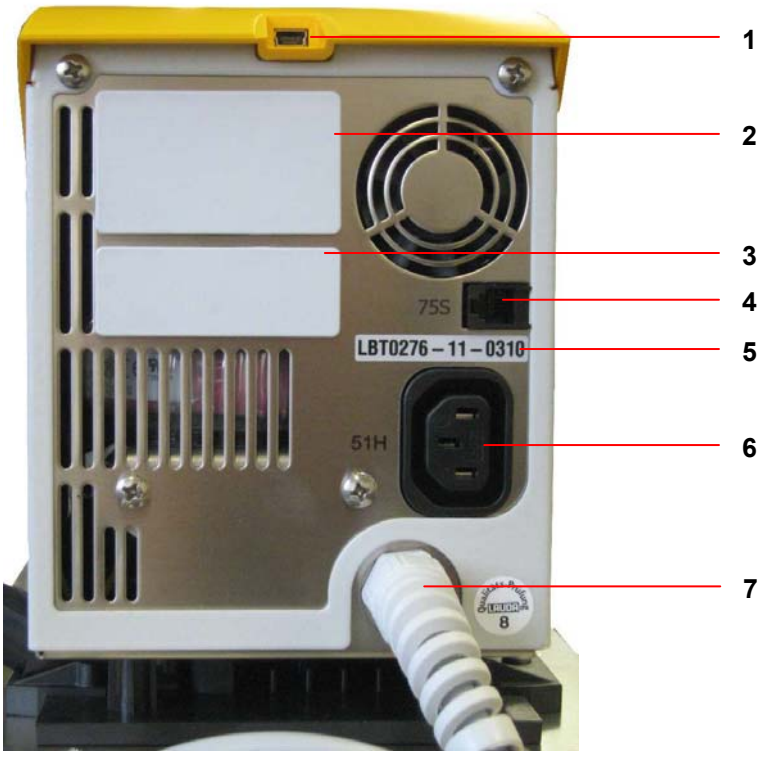
7 Key $T_{max}$ display and setting of the overtemperature switch-off point

### Ways of adjusting the pump flow

The circulation of the heat transfer liquid by the pump can be divided between internal (INT) and external (EXT) with the aid of the selector switch at the front on the control head (flow distribution). The adjustment is continuously variable and is also possible at any time during operation.

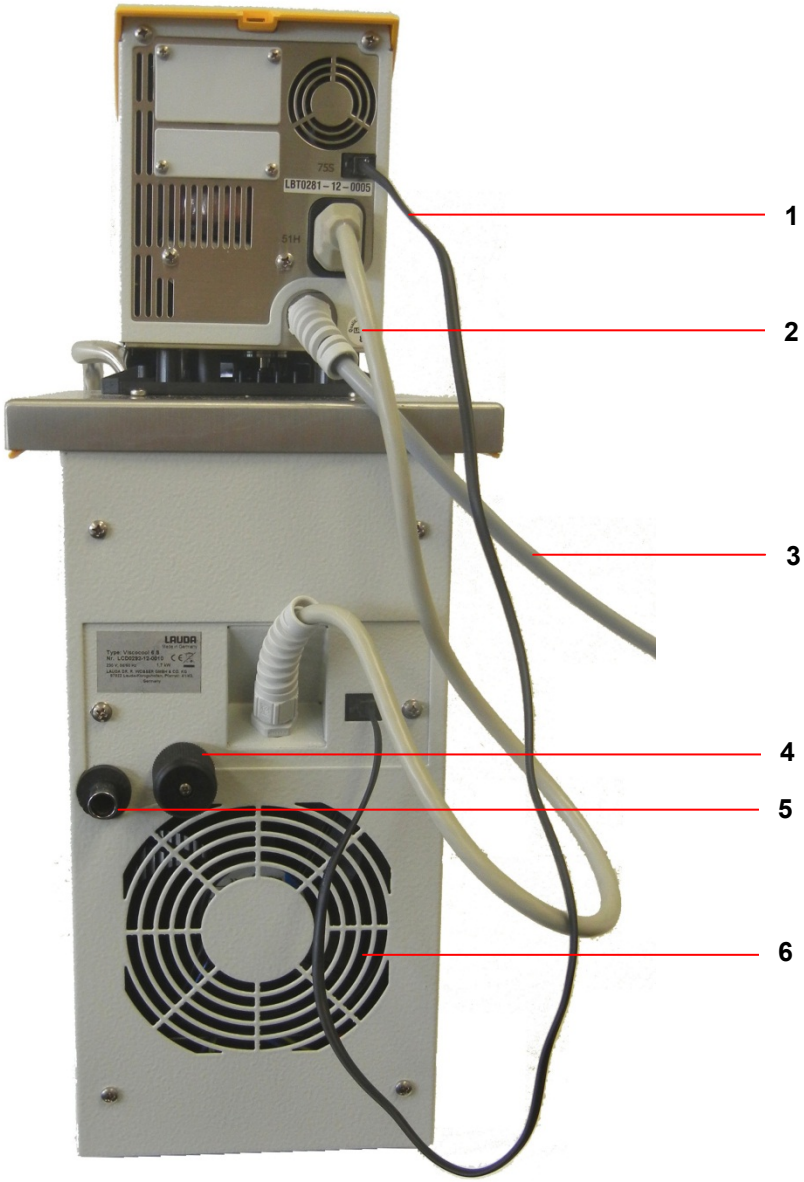
For maximum cooling power we recommend that the selector switch is set to internal (INT).

**Rear view of Control Head ECO SILVER**




1 Mini USB interface
2 Upper module receptacle approx. 51 x 27 mm for analog, RS 232/485, Profibus module and contact modules
3 Lower module receptacle approx. 51 x17 mm for Pt100/LiBus module
4 Connection socket 75S for bath illumination
5 Rating label of ECO SILVER Control Head
6 Connection socket 51H for power supply between the control head and cooling underpart
7 Mains connecting lead

**Back of the device**




1 Cable RJ11 4P/4C plug for bath illumination
2 Power supply, chiller
3 Power supply, complete device
4 Bath drain tap
5 Bath drain point
6 Ventilation grill

# 5 Transport and unpacking

Keep your original packing of your thermostat for later transport.

| Shipping damage |
|---|
| *Electric shock hazard* |
| • Check the device carefully for shipping damage before putting into operation.<br>• Never operate the device if you have found shipping damage. |

| Falling / toppling equipment |
|---|
| *Crushing of hands and feet, impacts* |
| • Use the handles.<br>• Site the device only on a level surface. |

Notice

| Falling / toppling equipment |
|---|
| *Property damage* |
| • Do not tilt the device during transport and never turn it upside down. |

Check the device and the accessories immediately after shipment for completeness and shipping damage. If contrary to expectations the device or accessories are found to be damaged, inform the shipping company immediately so that a report can be produced and the shipping damage examined.

Please also immediately inform **LAUDA Instrument Service** (⇨ 8.7).

**Standard accessories:**

| Order number | Quantity | Description | Remarks |
|---|---|---|---|
| HDQ 093 | 1 | Cover cpl. D 15 V | |
| HDR 016 | 1 | Cover cpl. D 15 KP/K | |
| EKS 087 | 1 | Cable RJ11 4P/4C plug | Connector for bath illumination |
| YAMD0024 | 1 | Operating Instructions<br>(this document) | |
| | | Warranty card | Please return the completed warranty card to LAUDA. |

**It is in your own interest to return the completed warranty card to LAUDA immediately.** (⇨ 8.7)

# 6 Before putting the device into operation

Please note:

The device can be operated up to an ambient temperature of 40 °C.

## 6.1 Assembly and siting

Always comply with the following safety information:

**Warning !**

| **Falling / toppling equipment on sloping surfaces / table edge** |
|---|
| *Crushing of hands and feet* |
| • Only site the device on flat surfaces, not near the edge of the bench or table. |

**Notice**

| **Overheating of the device** |
|---|
| *Property damage* |
| • Make sure there is sufficient wall spacing and avoid covering the ventilation grills so that adequate cooling and heat dissipation are ensured. |

## 6.2 Filling and emptying

LAUDA accepts no liability for damage caused by the use of unsuitable or unapproved heat transfer liquids (approved heat transfer liquids (⇨ 6.3)).

**Filling**

Withdraw the drain tap.

Optimum operation is ensured with a filling level in the lower third of the connection points (⇨ 3).

If the filling level in the thermostatic chamber is too low, a low-level alarm follows! (⇨ 8.1.2).

Take into account the displacement volume of any objects to be introduced into the bath.

**Draining and changing the heat transfer liquid**

*Bath drain point and drain tap*

Switch off the thermostat and withdraw the mains plug.

Allow the device and heat transfer liquid to cool down to or warm up to room temperature.

Push a hose onto the bath drain point.

Drain the heat transfer liquid by opening the drain tap at the back of the device.

Empty the thermostatic bath with a suitable pump/device.

Completely drain the inner vessel, thermostatic bath and accessories and flush or clean them (e.g. with new heat transfer liquid).

| Contact with hot heat transfer liquid |
|---|
| *Scalding* |
| • Bring heat transfer liquids to room temperature before draining.<br>• Make sure that the drain tap is closed after draining. |

## 6.3 Heat transfer liquid

**Note:**

Tap water is unsuitable for operation due to the calcium carbonate content. The bath vessel may calcify.

High purity water (from ion exchangers) and distilled or bidistilled water are unsuitable for operation due to the corrosive properties of these media. High purity water and distillates are suitable as a medium after the addition of 0.1 g of soda ($Na_2CO_3$, sodium carbonate) per liter of water.

Water containing iron (rust formation), chlorine (pitting) and untreated river water ("algae formation") is unsuitable.

The thermostatic cell of the LAUDA VISCOCOOL is produced from 1.4301 and the bath vessel from polycarbonate and is correspondingly resistant to mechanical and chemical stresses.

**a) Approved heat transfer liquid**

| LAUDA designation | Operating temperature range | Chemical designation | Viscosity (kin) | Viscosity (kin) at temperature | Flash point | Container size Order number | | |
|---|---|---|---|---|---|---|---|---|
| | °C | | mm²/s at 20°C | mm²/s | °C | 5 L | 10 L | 20 L |
| Aqua 90 ① | 5...90 | Decalcified water ① | 1 | -- | -- | **LZB 120** | **LZB 220** | **LZB 320** |

① At higher temperatures vaporization losses occur. In this case use the supplied bath cover. Use distilled water or pure demineralized water only after adding 0.1 g of soda ($Na_2CO_3$ sodium carbonate)/liter of water. Otherwise there is the risk of corrosion!

Do not use any contaminated heat transfer liquid. Contamination of the pump chamber may lead to the pump jamming and the device then switching off.

Pay attention to the safety data sheet for the heat transfer liquid. Follow the regulations for disposal of the used heat transfer liquid.

**If required, you can request the safety data sheets at any time.** (⇨ 8.7)

## 6.4 First switch-on

Make sure that the details on the name-plate match the mains voltage and frequency.

**Notice**

| Use of inadmissible mains voltage or frequency |
|---|
| *Property damage* |
| • Compare the rating label with the available mains voltage and frequency. |

**Note:**

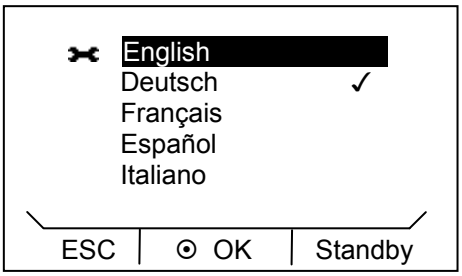
The device mains plug is used as a mains disconnection component. The mains plug must be easily recognizable and easily accessible.

Only connect the device to a socket with a protective earth conductor (PE). No liability is accepted for incorrect mains connection.

Make sure that the unit is filled according to section (⇨ 6.2).

**Menu language**

When switching the device on for the first time, you can select your desired menu language with the cursor keys ▲ and ▼. Confirm your choice with the enter key ●.




The menu language can be changed at any time (⇨ 7.4.6).

**Note:**

The thermostatic head has a high precision Pt100 temperature probe which facilitates exact temperature control.

Due to the method of construction as a double chamber system, with an unfavorable relationship between the bath temperature and ambient temperature an offset of the bath temperature to the thermostatic chamber temperature can occur.

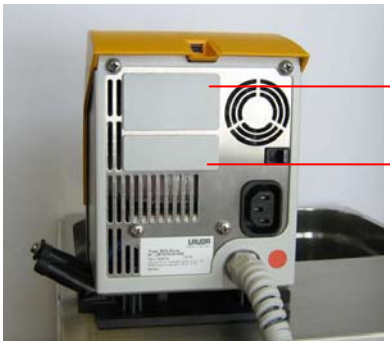
We always recommend that an offset adjustment (12.7) for the relevant temperature range is carried out or that our external temperature probe is used (6.5).

## 6.5 Installation of modules

When installing modules, always follow this safety information:

| Live parts during module installation |
|---|
| *Electric shock hazard* |
| • Disconnect the device from the mains before module installation.<br>• Have the installation carried out only by a specialist. |

The ECO SILVER control head can be supplemented with interface modules which are inserted at the rear of the control head in two different module slots.



Upper module receptacle (approx. 51 mm x 27 mm) for the RS 232/485 module /Analog module/ Contact module / Profibus module.

Lower module receptacle (approx. 51 mm x17 mm) for the Pt100/LiBus module.

Touch the bare earthed stainless steel back panel of the ECO thermostat to discharge any electrostatic charge.

Remove the module from the packaging.

Switch off the thermostat and withdraw the mains plug.

The cover of the module receptacle has a recess on each side to lever it off. Insert a screwdriver first in the right and then in the left recess and lever it up carefully.

Pull the bus connecting lead out of the cover.

Plug in the bus connecting lead (red plug in the red socket).

Introduce the module into the appropriate receptacle and fasten it using the two cross-head screws.

Insert the mains plug again and switch on the thermostat.

The connectors have reverse-polarity protection. The plug has a projection which slides into a notch on the socket.

# 7 Operation

Always follow this safety information:

| Contact with heat transfer liquid or hot surfaces |
|---|
| *Burns, scalds* |
| • Only operate the device with its housing.<br>• Avoid splashes and hand contact with hot heat transfer liquid.<br>• Do not touch the drainage point connection and nozzle pipe in the operating state.<br>• Use CE gloves, protective clothing and eye protection. |

| Bath overflow due to thermal expansion or immersion of objects |
|---|
| *Burns, scalds* |
| • Take the volume of external loads into account.<br>• Take into account the increase in volume with a rise in temperature. |

| Inadmissible operating temperatures |
|---|
| *Burns, scalds* |
| • The bath vessel must not be heated above 95°C, because adhesion points might loosen, allowing bath medium to escape. |

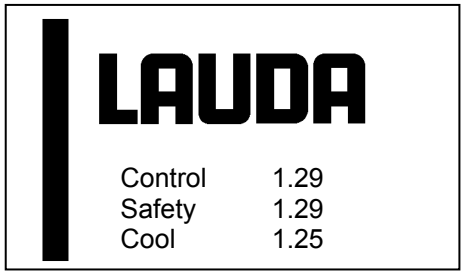
**Notice**

| Inadmissible operating temperatures |
|---|
| *Property damage* |
| • Note the various limitation options ($T_{ih}$, $T_{il}$, $T_{max}$, correction limitation).<br>• Set the overtemperature switch-off point $T_{max}$ according to the heat transfer liquid (at least 25 K below the fire point). |

## 7.1 Switching on

**1 s**

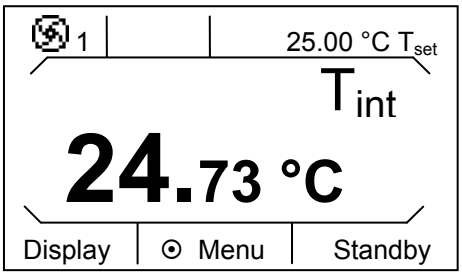
Switch on the device with the mains switch at the front. An acoustic signal sounds.




Corresponding to the adjacent display the version numbers of the software appear for approx. five seconds.

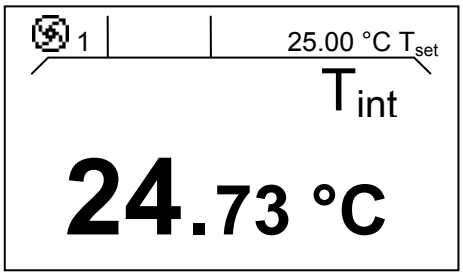
When making technical queries, please have the version numbers together with the device serial number (⇨ 8.2.5) to hand.

Further installed modules are displayed in Settings → Device Status → Software version.



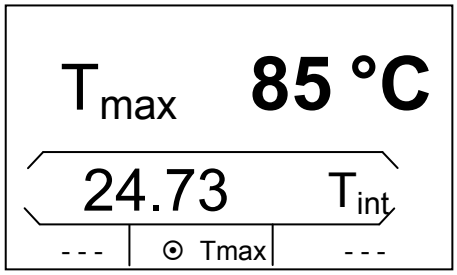

The current bath temperature ($T_{int}$), pump level as well as the pump symbol, the set-point temperature $T_{set}$ and the soft-key bar at the bottom edge of the display are displayed.

For the optimum use of the display representation, the soft-key bar disappears if no key has been pressed for at least ten seconds. The representation can be reactivated by pressing any key.




The pump starts up (exception: "Standby" operating status).

When standby is activated (⇨ 7.4.4), the last operating values are taken over.



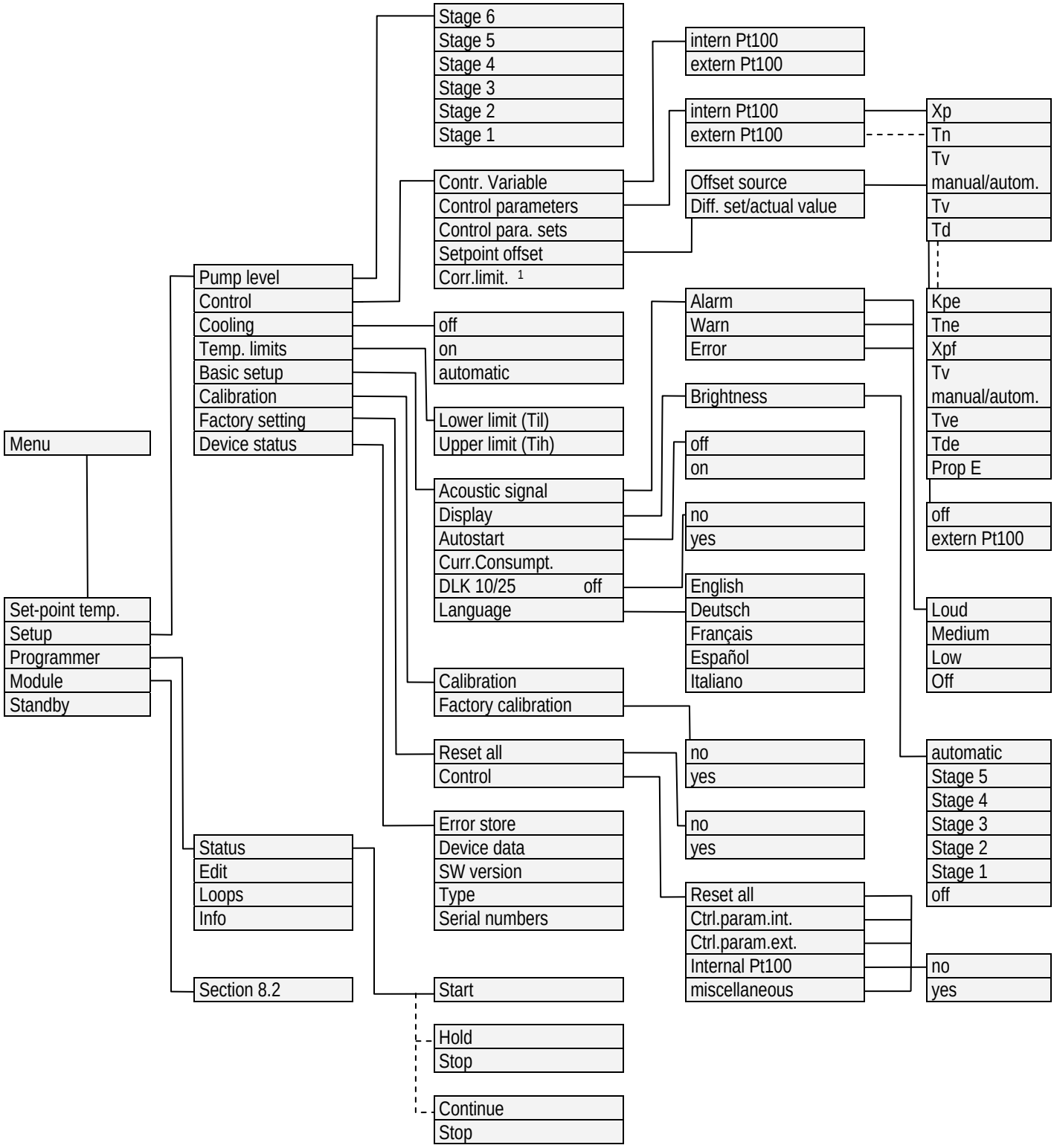

With the key you check or change the overtemperature switch-off point:

On pressing the key $T_{max}$ the value in the upper line is displayed;

(Setting the overtemperature switch-off point $T_{max}$ (⇨ 7.4.1))

## 7.2 Menu structure

With the soft keys you can select the following menu points with the ECO SILVER control head:



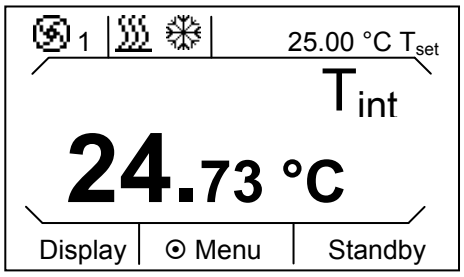

1 Correction limitation

## 7.3 Display representation

The ECO thermostats offer you intuitive user guidance. In the following the possible window views and the symbols used are explained.

### 7.3.1 Basic window

Basic window in the **normal display**

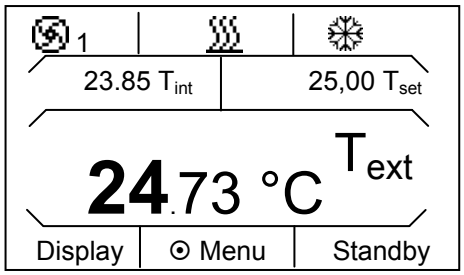



The following information is displayed depending on the operating status:

| | |
|---|---|
| | Pump runs with displayed pump level; |
| | Heater is active; |
| | Chiller is active; |
| $T_{set}$ | Set-point temperature |
| $T_{int}$ | Current bath temperature |
| $T_{ext}$ | Temperature of the external temperature probe (if connected). |
| Display, ⊙Menu, Standby | Soft-key bar; function call via designated keys; |

Apart from the normal display of the basic window, there is another display. This includes in addition a further status display. With the soft-key bar activated changeover between the two display representations is obtained by pressing the left soft key. With both displays the soft-key bar disappears if no key has been pressed for at least ten seconds. The display of it can be reactivated by pressing any key.

Basic window in the **expanded display**




The following information is displayed depending on the operating status:

| | |
|---|---|
| | Pump runs with displayed pump level; |
| | Heater is active; |
| | Chiller is active; |
| $T_{int}$ | Current bath temperature; |
| $T_{set}$ | Set-point temperature; |
| $T_{ext}$ | Temperature of the external temperature probe (if connected); |
| Display, ⊙Menu, Standby. | Soft-key bar; function call via designated keys; |

With a connected external sensor and its selection as the control variable, the basic window with the expanded status display is always active.

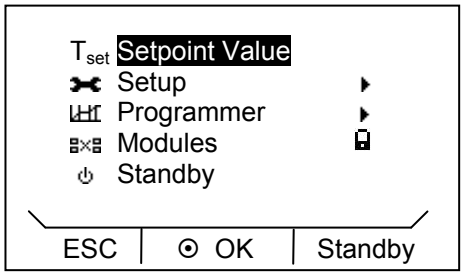
### 7.3.2 Menu window

The menu of the ECO SILVER thermostats consists of several menu levels. With the cursor keys ▲, ▼, ◀, ▶ you can call the menu points and select them with the enter key ●.

| | |
|---|---|
| ⊙ | Symbolizes the enter key or its assigned function. |
| ✓ | Displays the currently selected function. |
| ▶ | Indicates that further menu levels (submenus) are present. |
| 🔒 | The padlock symbolizes a locked function. (Possible reasons: lack of access rights or function deactivated by parameter settings). |

Examples of display representation:

**Main menu**

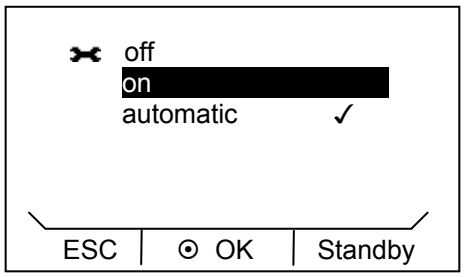



In the main menu the selected menu point is shown inversely.

The soft-key bar is shown in the lower region of the display. The following functions, for example, can be selected with the soft keys:

| | |
|---|---|
| ESC | You return to the main menu level. |
| OK ● | You access the submenu (this can also occur by confirming ▶). |
| Standby | Standby is activated. If Standby is inversely highlighted, standby is active. If not, the de vice is in operation. |

**Submenu** "Cooling"



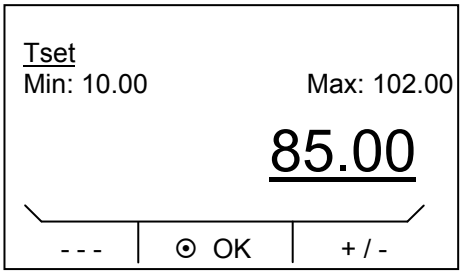

In window example the following information is displayed:

The setting on is displayed inversely and can be selected by pressing the enter key ●.

A tick ✓ behind the menu point indicates that this setting is active. In the example the cooling is set to "automatic".

### 7.3.3 Entry window

Values are input using the entry window.




In the entry window the following information is displayed:

In the first line the entry parameter is shown in short form (cf. example $T_{set}$).

Min. and Max. state the limits for the value entry.

The value to be entered is shown in large characters. The cursor flashes under the value.

You can change the value with the cursor keys ▲ or ▼. If you keep one of the two cursor keys pressed, input is sped up.

By pressing ◀ or ▶ you can also select numbers individually and change them with ▲ or ▼.

By pressing (+/-) the arithmetic sign can be changed.

The enter key ⊙ accepts the set value.

By pressing (ESC) you are returned to the menu level without changes.

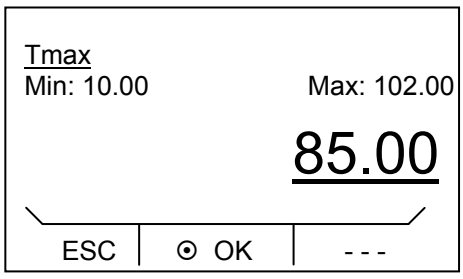
## 7.4 Basic setup

In this section the settings needed for proper use as prescribed are summarized. You are referred to the appendix (⇨ Other settings) for further settings.

### 7.4.1 Setting the overtemperature switch-off point $T_{max}$

| **Overheating due to entering an incorrect $T_{max}$ and set-point temperature** |
|---|
| *Burns, scalds* |
| • Set $T_{max}$ in each case according to the heat transfer liquid used. |

*Keep the key $T_{max}$ pressed during the whole set-up procedure:*



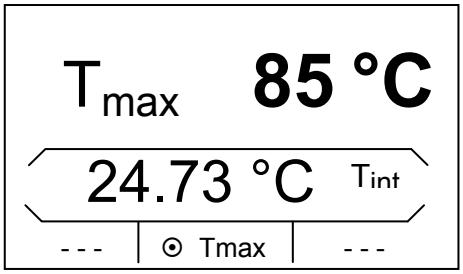

Press the enter key ⊙.

The entry window appears. The cursor flashes under the $T_{max}$ value. The maximum and minimum adjustable temperature values are displayed.

Change the value with ▲ or ▼.

Note: When pressed for longer, the figures run through faster.

Single figures can be selected by pressing ◀ or ▶.



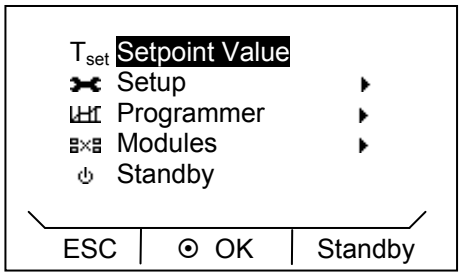

Confirm your choice with the enter key.

*On releasing the key you return to the menu level without changes.*

The following applies to $T_{max}$: 5 Kelvin above the desired bath temperature.

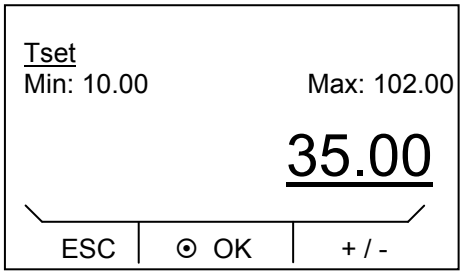
### 7.4.2 Setting the temperature set-point value

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key.

Select the colored highlighted menu point Setpoint Value using the enter key.




The entry window appears. The cursor below the temperature value flashes and can be changed within the displayed limits.

Change the value with ▲ or ▼.

Single figures can be selected by pressing ◀ or ▶.

With appropriate equipment, by pressing (+/-) the arithmetic sign can be changed.

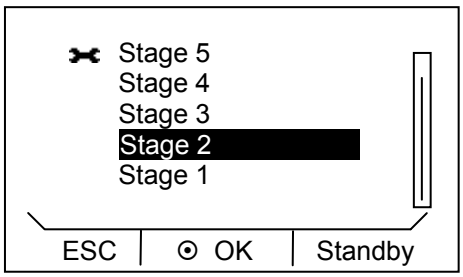
Confirm your choice with the enter key.

By pressing (ESC) you are returned to the menu level without changes.

### 7.4.3 Setting the pump level

With the ECO Vario pump you have six pump levels available with which you can optimize the bath circulation, flow rate and pressure and the mechanical heat input.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key ●.

The adjacent menu window appears by selecting and confirming → Setup → Pump level.

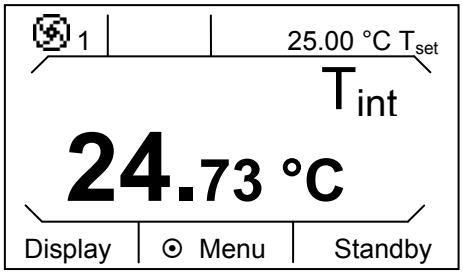
The level can be selected with ▼ or ▲. The selected level becomes active immediately (in this example it is Stage 2).

*You quit the menu by pressing ▬ (ESC), ◀ or ●.*

### 7.4.4 Activating the "Standby" operating state

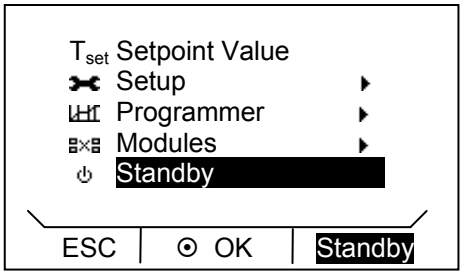
In the "Standby" operating state the pump, heating and cooling unit are switched off. The operating display remains active.

You activate the soft-key bar by pressing any key.




There are two ways of selecting the standby mode:

1. Activating "Standby" by pressing ▬ (right soft key).




2. Access to the main menu level is obtained by pressing the enter key ●.

Select "Standby" with ▲ or ▼ and confirm it with ●.

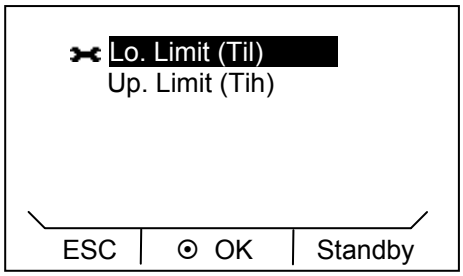
If "Standby" is active, it is highlighted in color in the soft-key bar: Standby.

Note: By pressing the entry key ● again you return to the active operating state.

### 7.4.5 Defining temperature limits

The temperature limits Til and Tih are defined with this function. If, for example, you are using water as the heat transfer liquid, +5 °C would be practicable as the minimum temperature and +90 °C as the maximum temperature.

You activate the soft-key bar by pressing any key.

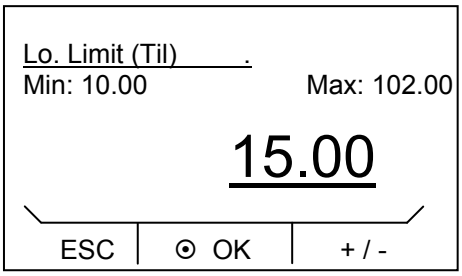



Access to the main menu level is obtained by pressing the enter key ⊙.

Selection and confirmation of → Setup → Limits.

The adjacent menu window appears.

Select the lower (Til) or upper (Tih) limit with ▲ or ▼ and confirm it with ⊙.




In the entry window the cursor flashes below the value to be changed. The permissible adjustment range is indicated with Min and Max.

Change the value with ▲ or ▼.

Single figures can be selected by pressing ◀ or ▶.

By pressing ▬ (+/-) the arithmetic sign can be changed.

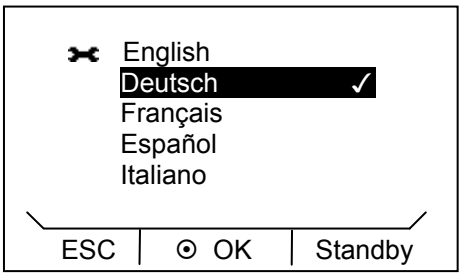
Confirm your choice with the enter key ⊙.

*By pressing ▬ (ESC) you are returned to the menu level without changes.*

### 7.4.6 Selecting the menu language

The ECO SILVER thermostats offer you the possibility of selecting the menu languages of English, German, French, Spanish and Italian.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key ⊙.

Selection and confirmation of → Setup → Basic setup. → Language.

The adjacent menu window appears.

Select the language with ▲ or ▼ and confirm it with ⊙.

*By pressing ◀ or ▬ (ESC) you are returned to the menu level without changes.*

# 8 Maintenance

## 8.1 Alarms, warnings and errors

| | |
|---|---|
| **Alarms**: | Alarms are relevant to safety. Pump, heating and chiller switch off. |
| **Warnings**: | Warnings are normally not relevant to safety. The device continues to run. |
| **Errors**: | If a malfunction occurs, switch off the unit at the mains switch. If the malfunction recurs after switching on the device, contact LAUDA Instrument Service (⇨ 8.7) or your local service organization. |

All alarms, warnings or error messages triggered on the ECO thermostat are shown in the display as text. You will find the list with alarms and warnings in the appendix (⇨ 13).

Once the cause has been rectified, alarms and warnings can be cleared with ●.

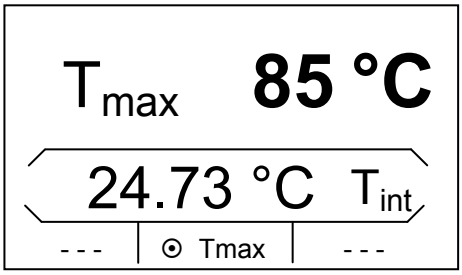
Warnings can be ignored with ● without the message periodically appearing again.

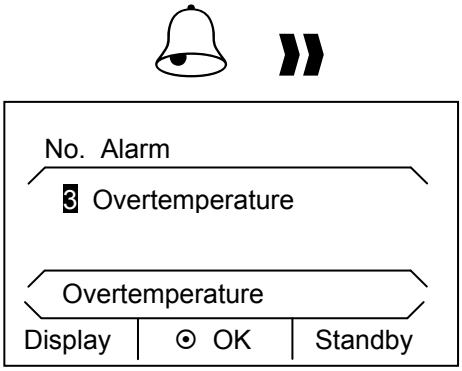
### 8.1.1 Overtemperature protection: Alarm and checking

| **Overheating due to entering an incorrect $T_{max}$ and set-point temperature** |
|---|
| *Burns, scalds* |
| • Set $T_{max}$ in each case according to the heat transfer liquid used. |

Set the overtemperature switch-off point as described in (⇨ 7.4.1). Recommended setting: 5 K above the desired maximum bath temperature (Remark: The overtemperature switch-off point $T_{max}$ is controlled by a system which operates independently of the bath control).

The set overtemperature switch-off point is displayed on pressing in the display.






When the bath temperature lies above the overtemperature switch-off point, a two-tone alarm signal sounds. "Overtemperature" appears in the display, the heating switches off on all poles and the pump and chiller are switched off electronically.

Rectify the cause of the malfunction.

Wait until the bath temperature has cooled below the cut-off point or set the cut-off point higher than the bath temperature.

If "Overtemperature" appears in the display:

unlock the "Overtemperature" indication with ●.

Before a longer period of unsupervised operation **check** the **overtemperature protection**:

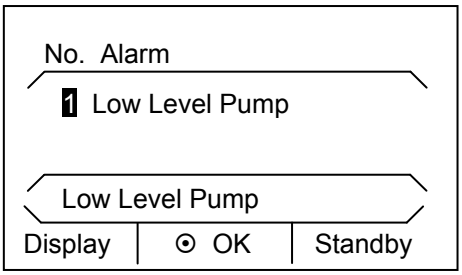
Slowly reduce $T_{max}$ as described in (⇨ 7.4.5). The thermostat should switch off when the actual temperature is greater than $T_{max}$.

An alarm message (step 1-2, see above) should follow.

Reset the switch-off point to be higher than the bath temperature.

Unlock the "Overtemperature" indication with ●.

### 8.1.2 Low level: Alarm and checking




When the liquid level falls so far that the heaters are no longer completely covered with liquid, a two-tone alarm sounds. "Low Level Pump" appears in the display, the heating switches off on all poles and the pump and chiller are switched off electronically.

Rectify the cause of the malfunction.

Top up the missing heat transfer liquid (⇨ 6.2 and 6.3).

Unlock the "Low Level Pump" indication with ●.

**Check the safety system at regular intervals** (⇨ 8.3.2) by lowering the bath level. Do not carry out this test at a bath temperature below 10°C or above 50°C in order to avoid hazards due to temperatures which are too cold or too hot.

An alarm message (step 1-2, see above) should follow.

Top up with heat transfer liquid.

Unlock the "Low Level Pump" indication with ●.

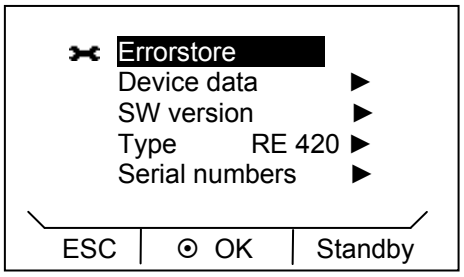
Switch the device off immediately and withdraw the mains plug if irregularities occur when checking the safety equipment.

Contact LAUDA Instrument Service (⇨ 8.7) or your local service.

## 8.2 Device status

Here you can recall error messages as well as device and software data.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key ⊙.

Selection and confirmation of → Setup → Device Status.

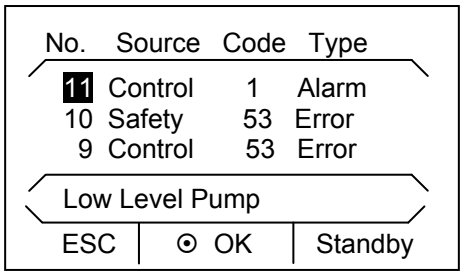
The adjacent menu window appears.

Here you can now:

| | |
|---|---|
| Errorstore | read out the error store, |
| Device data | fetch device data, |
| SW version | fetch software version, |
| Type | fetch device type, |
| Serial numbers | fetch serial numbers. |

### 8.2.1 Memory for errors, alarms and warnings

For error analysis the ECO thermostats have an error memory in which up to 140 warning, error and alarm messages can be saved.-




Error store

confirm with ⊙.

The newest message is located in the first position.

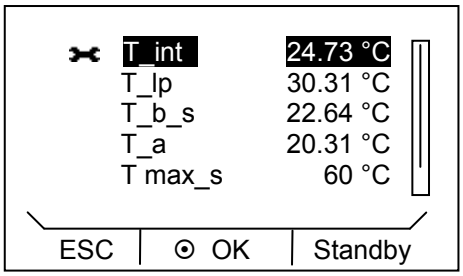
Navigate with ▲ or ▼ through the events which are sorted by date. The message text appears in the footer.

The relevant module which is causing the message is displayed under "Source".

"Code" is the coded alarm, warning or error description.

"Type" specifies alarm, warning or error. You will find the list of alarms and warnings in the appendix (⇨ 13).

### 8.2.2 Device data

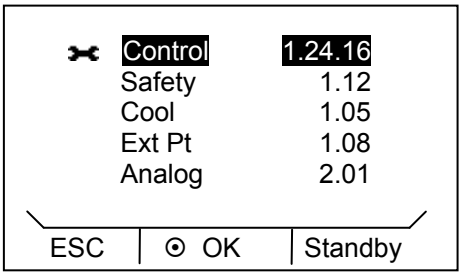



Device data

confirm with ⊙.

The device parameters are displayed under the menu point Device data.

### 8.2.3 Software version




SW version

confirm with ⊙.

Under the menu point SW version the appropriate software versions are displayed, depending on the device type and connected modules.

### 8.2.4 Displaying and changing the device type

Type

confirm with ⊙.

The device type without the suffix "S" (SILVER) is shown in the menu.

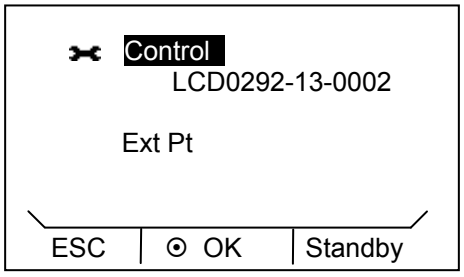
**Note:**

**When changing over, all parameters are reinitialized and the control parameters you have adapted are lost!** Consequently, the type change has a 3 second key depression delay.

The overtemperature switch-off point $T_{max}$ is automatically adjusted to the selected device type.

Now you have to manually re-enter $T_{max}$ (⇨ 7.4.1), because otherwise the device goes into the error status (error message in ECO SILVER: "Tmax diff. C to S").

### 8.2.5 Displaying serial numbers




Serial numbers

confirm with ⊙.

The serial numbers of Control and Safety are displayed under the menu point Serial numbers. Provided they are available, the serial numbers of connected modules are also displayed.

## 8.3 Servicing

Follow all the safety instructions when cleaning or maintaining the device.

| Critical temperature of device parts, heat transfer liquid or accessories (hoses) |
|---|
| *Burns, scalds* |
| • Bring the device parts, accessories and heat transfer liquid to room temperature before touching them.<br>• Have repairs carried out only by a specialist. |

### 8.3.1 Cleaning

| Live parts in contact with cleaning agents |
|---|
| *Electric shock hazard* |
| • Disconnect the device from the mains before cleaning. |

Cleaning can be carried out using water with a few drops of a surfactant (washing-up liquid) added and with the aid of a damp cloth.

**Notice**

| Live parts in contact with cleaning agents |
|---|
| *Property damage* |
| • Disconnect the device from the mains before cleaning.<br>• Water and other liquids must not enter the controller. |

Clean the control head only with the cleaning agents water (with washing-up liquid), benzine or spirit.

Do not use acetone or aromatic hydrocarbons (thinners). This would result in permanent damage to the plastic surfaces.

Before all maintenance or cleaning work it must be ensured that decontamination of the device is carried out if it has been in contact with hazardous materials.

### 8.3.2 Servicing intervals to VDI 3033

| Device part | Mandatory with initial operation and before longer unsupervised operation, recommended frequency thereafter | Section | Remarks |
|---|---|---|---|
| **Complete device** | | | |
| External condition of device | Monthly | | |
| **Heat transfer liquid** | | | |
| Inspecting the heat transfer liquid | every six months | (⇨ 8.3.3) | |
| **Bath vessel with drain tap** | | | |
| Sealing | Daily | | External inspection |
| **Electronics** | | | |
| Overtemperature protection | Quarterly | (⇨ 8.1.1) | |
| Low-level protection | Quarterly | (⇨ 8.1.2) | |

Bring the device parts and accessories to room temperature before touching them.

### 8.3.3 Inspecting the heat transfer liquid

If the heat transfer liquid becomes contaminated or degenerated, it must be renewed.

If required, but at least every six months, the heat transfer liquid must be inspected for usability. Further use of the heat transfer liquid is only permissible if the inspection indicates this.

The test of the heat transfer liquid takes place according to DIN 51529; ("Testing and assessment of used heat carrier media"). Source: VDI 3033; DIN 51529.

**Caution !**

| Critical temperature of the heat transfer liquid |
|---|
| *Scalding* |
| • Bring the heat transfer liquid to room temperature for the analysis. |

## 8.4 Fault finding

Before you contact the LAUDA Service (⇨ 8.7), check whether you can rectify the faults yourself with the hints described further below.

Comply with the following safety information:

| **Live parts when fault finding** |
|---|
| *Electric shock hazard* |
| • Disconnect the device from the mains before the repair (e.g. when changing components).<br>• Have the repair carried out only by a specialist. |

| **Rotating / live parts when removing the ventilator fan** |
|---|
| *Cuts, crushing, electric shock hazard* |
| • Disconnect the device from the mains before the repair.<br>• Have the repair carried out only by a specialist. |

| **Uncontrolled start-up on release of jammed pump** |
|---|
| *Crushing, electric shock hazard* |
| • Disconnect the device from the mains before the repair.<br>• Have the repair carried out only by a specialist. |

| **Critical temperature of device parts, heat transfer liquid or accessories (hoses)** |
|---|
| *Burns, scalds* |
| • Bring the device parts, accessories and heat transfer liquid to room temperature before touching them.<br>• Have repairs carried out only by a specialist.<br>• Affix the symbol "Hot surface". |

| Fault | Possible remedy |
|---|---|
| Device does not cool | Temperature limit Til too high → Reduce temperature limit Til ⇨ 7.4.5. |
| Device does not heat up | Temperature limit Tih too low → Increase temperature limit Tih (⇨ 7.4.5). |
| Device does not pump | Check selector switch for dividing up the external and internal pump flow (⇨ 6.1); pump blocked by foreign bodies. |

## 8.5 Disposal information

The following applies to Europe: The disposal of this device must only be carried out by qualified specialist staff according to EC Directive 303/2008/EC in conjunction with 842/2006/EC.

The disposal must be carried out according to the EC Directive 2002/96/EC.

For Germany ChemKlimaschutzV applies.

### 8.5.1 Disposal of the packaging

The following applies to Europe: The disposal of the packaging must be carried out according to the EC Directive 94/62/EC.

For Germany the Packaging Act (VerpackV) applies.

## 8.6 Decommissioning of the device

The device must be decommissioned by a specialist. Comply with the following safety information:

| Contact with hot heat transfer liquid |
|---|
| *Scalding* |
| • Bring the heat transfer liquid to room temperature before draining.<br>• Drain the device and any accessories before packing thoroughly. |

| Contact with hot surfaces |
|---|
| *Burns* |
| • Bring the surfaces to room temperature before touching them. |

| Falling / toppling equipment |
|---|
| *Crushing of hands and feet, impacts* |
| • Use the handles. |

## 8.7 Ordering replacement parts / LAUDA Service

When ordering replacement parts state the serial number from the rating label; this helps to avoid queries and incorrect deliveries.

The serial number is composed as follows,
e.g. **LCK1910-11-0001**

LCK1910 = Order number
11 = Year of manufacture 2011
0001 = Incremental numeration

Your contact for maintenance and expert service support.

LAUDA Service
Phone: +49 (0)9343/ 503-236 (English and German)
Fax: +49 (0)9343/ 503-222
E-mail service@lauda.de

We are available at any time for queries and ideas!

LAUDA DR. R. WOBSER GMBH & CO. KG
Postbox 1251
97912 Lauda-Königshofen
Germany
Phone: +49 (0)9343/ 503-0
Fax: +49 (0)9343/ 503-222
E-mail info@lauda.de
Internet http://www.lauda.de/

# 9 Accessories

Please refer to the following table for order numbers for accessories.

| Accessories | Order number |
|---|---|
| **Upper module receptacle approx. 57 x 27 mm** | |
| Analog module | **LRZ 912** |
| RS 232/485 interface module | **LRZ 913** |
| Contact module with 1 input and 1 output | **LRZ 914** |
| Contact module with 3 inputs and 3 outputs | **LRZ 915** |
| Profibus module | **LRZ 917** |
| **Lower module receptacle approx. 57 x 17 mm** | |
| External Pt100/LiBus module | **LRZ 918** |
| Remote control unit Command* | **LRT 914** |

* functions only in conjunction with LRZ 918.

# 10 Technical data and graphs

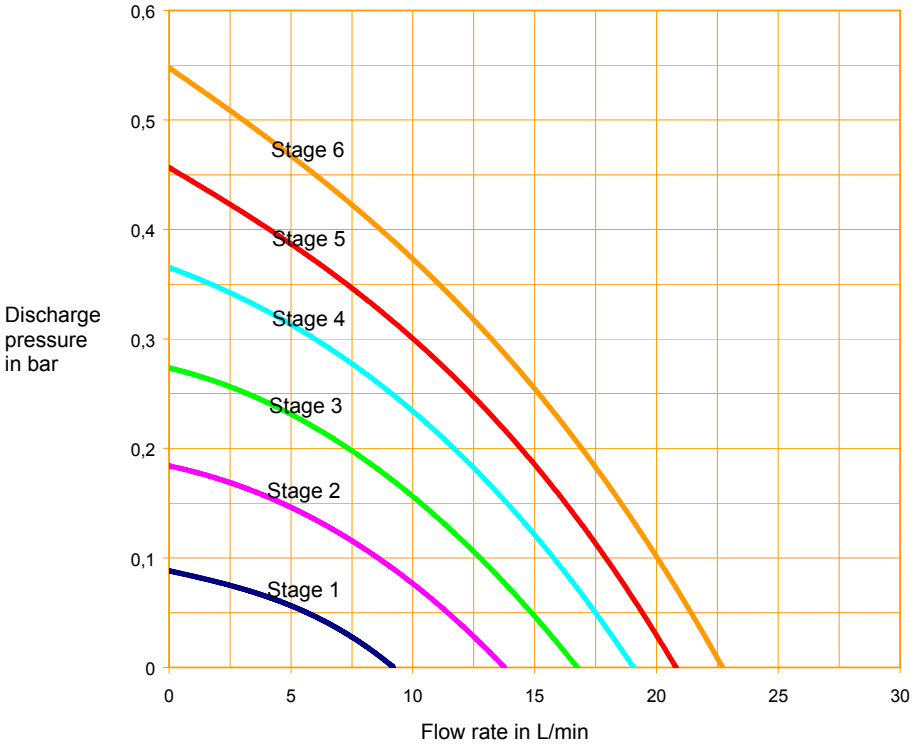
**The figures were determined according to DIN 12876.**

| | | |
|---|---|---|
| Ambient temperature range | °C | 5 ... 40 |
| Relative humidity | | Maximum relative humidity 80% at 31°C and decreasing linearly to 50% up to 40°C. |
| Contamination level | | 2 |
| Setting resolution | K | ±0,01 |
| Display resolution | K | ±0,01 |
| Temperature measurement | | |
| Absolute accuracy | K | ±0.3 K and ±0.5 % of the relative measurement |
| Temperature stability | K | ± 0.01 |
| Pump type/number of power levels | | Pressure pump/6 |
| Discharge pressure, max. | bar | 0.55 |
| Discharge flow, max. | L/min | 22 |
| Display field | | LCD display 3.0"; 128 x 64 pixel |
| Programmer | | One program with a total of 20 temperature/time segments (⇨ 15) |
| Standard interface | | Mini-USB |
| Class of protection | | IP 21 |
| Classification | | III |
| Overvoltages | | Overvoltage Category II and transient overvoltages according to Category II. |
| Class of protection for electrical operating equipment DIN EN 61140 (VDE 0140-1) | | Class I |

| | | **ECO SILVER** | | | |
|---|---|---|---|---|---|
| | | **230 V** | **220 V** | **115 V** | **100 V** |
| Working temperature range ① | °C | 15…90 | | | |
| Heater rating / power consumption | kW | 1.3 / 1.4 | 1.2 / 1.3 | 1.3 / 1.4 | 1 / 1.1 |
| Heater surface loading | W/cm² | 6.8 | 6.2 | 6.8 | 5.1 |
| Bath depth | mm | 330 | | | |
| Overall dimensions (W x D x H) | mm | 206 x 415 x 530 | | | |
| Weight | kg | 17.0 | 17.0 | 17.0 | 17.0 |
| **Mains connection** | | **Order number** | | | |
| **230 V; 50/60 Hz** | | **LCD 0292** | **---** | **---** | **---** |
| **220 V; 60 Hz** | | **---** | **---** | **---** | **---** |
| **115 V; 60 Hz** | | **---** | **---** | **LCD 4292** | **---** |
| **100 V; 50/60 Hz** | | **---** | **---** | **---** | **LCD 6292** |

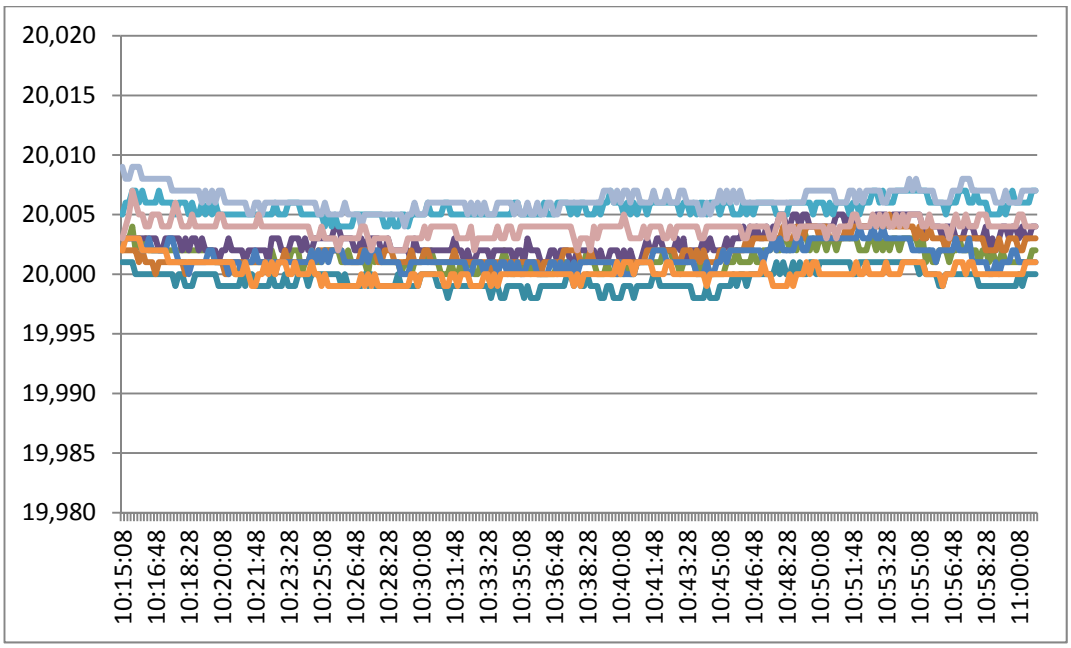
① at Pump power level 1

## Pump characteristic ECO SILVER

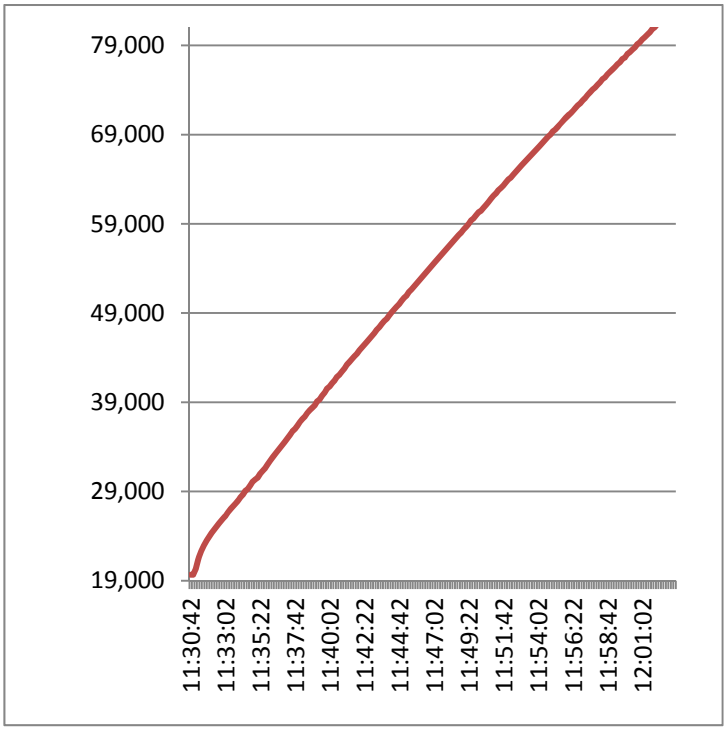



Pump characteristics measured with water

## Homogeneity of Viscocool at 20°C, Pump Level 6

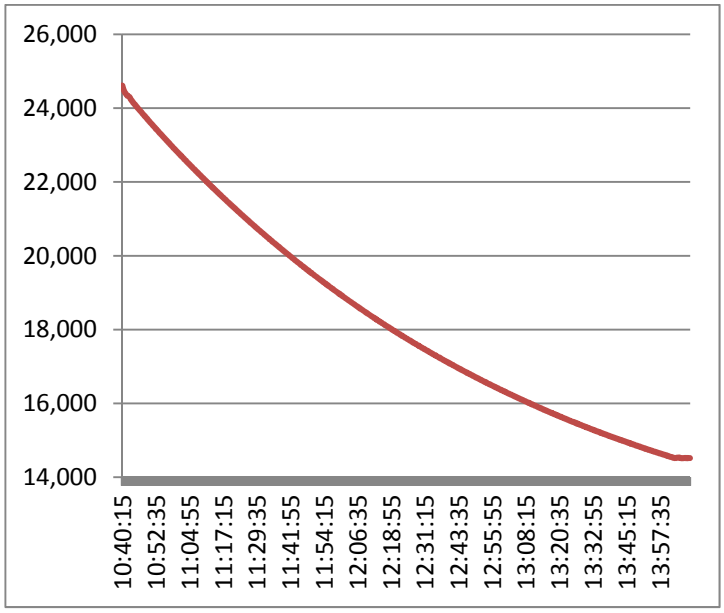


**Viscocool heating curve**




Heat transfer liquid:
Water,
bath closed.

**Viscocool cooling curve**




Heat transfer liquid:
Water,
bath closed.

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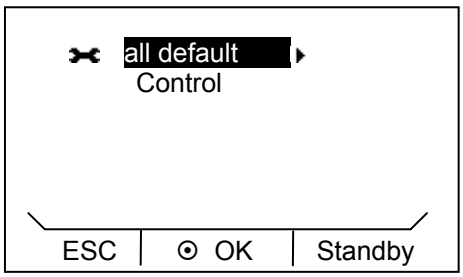
# Appendix with settings

The adjustments described in this appendix are intended for specially qualified personnel.

# 12 Other settings

## 12.1 Resetting to factory settings

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key.

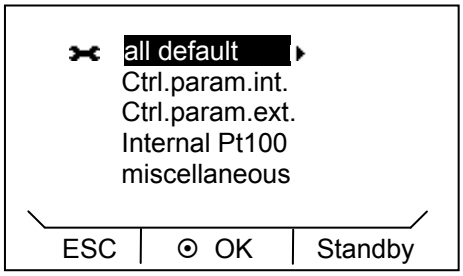
Selection and confirmation of → Setup → Factory Setting.

The adjacent menu window appears.

If all default is selected, you can choose between "no" and "yes".

With no you return to the "Factory Setting" menu level without changes being made.

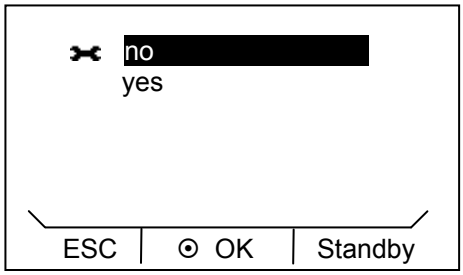
With yes all settings are reset.




By selecting Control you can select the displayed parameters with ▲ or ▼.

The parameters can be reset individually.

With "Miscellaneous" the following can be reset: set value, pump level, max. current consumption, control to "internal" and autostart to "auto".




For all menu points under "Control", you can choose between "no" and "yes".

With ▲ or ▼ select "yes" to reset the respective parameter.

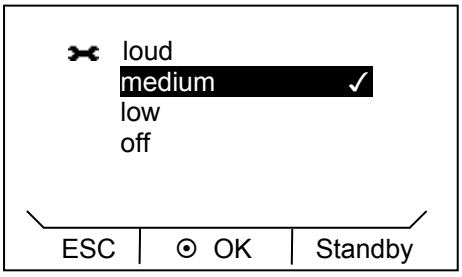
If "no" is selected, the parameters remain unchanged.

*By pressing ◀ or ▬ (ESC) you are returned to the menu level without changes.*

## 12.2 Setting the volume of the acoustic signals

The ECO SILVER thermostats signal alarms and errors as a two-tone acoustic signal. Warnings are signaled as a continuous tone.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key.

Selection and confirmation of → Setup → Basic setup. → Acoustic signal.

Choose Alarm, Warn or Error.

The adjacent menu window appears.

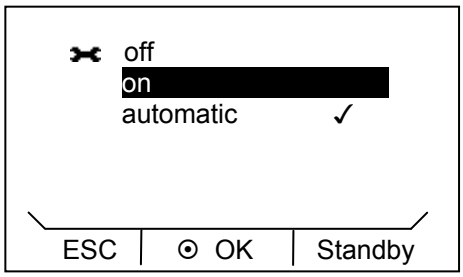
The volume is selected with ▲ or ▼. The selected level is immediately active without confirmation. (In this example the volume is Medium.

*By pressing ▬ (ESC), ◀ or ● you are returned to the menu level without changes.*

## 12.3 Setting the chiller

The chiller of the cooling thermostats is normally operated in the "automatic" operating mode. Here, the chiller switches on or off automatically depending on the temperature and operating status. However, you can also switch the chiller on or off manually.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key.

Selection and confirmation of → Setup → Cooling.

The adjacent menu window appears.

With ▲ or ▼ and ● you select and confirm the operating status "off", "on" or "automatic".

In the menu the set operating status is displayed by a tick ✓.

*By pressing ◀ or ▬ (ESC) you are returned to the menu level without changes.*

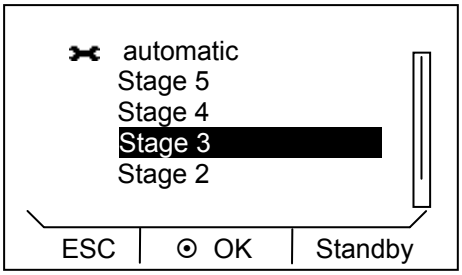
**Note:**

When the chiller is switched off, it can take up to two minutes before it switches on again.

## 12.4 Setting the display brightness

The thermostats of the ECO equipment line have a sensor which automatically adapts the display brightness according to the ambient light level. However, the automatic adaptation can be deactivated and the brightness set manually.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key.

Selection and confirmation of → Setup → Basic setup. → Display → Brightness.

The adjacent menu window appears.

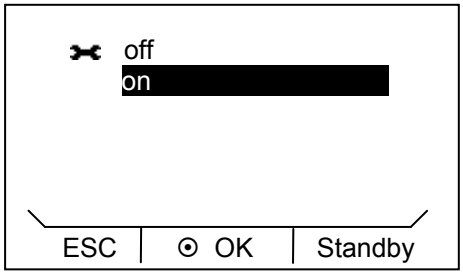
Select "automatic", "Stage" or "off" with ▲ or ▼. The selected stage is immediately active without confirmation.

*By pressing ▬ (ESC), ◀ or ● you are returned to the menu level without changes.*

## 12.5 Defining the starting mode (Autostart)

Generally it is required that the thermostat starts operating again after a power interruption. For e.g. safety considerations, you can insert a manual activation step.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key.

Selection and confirmation of → Setup → Basic setup. → Autostart.

The adjacent menu window appears.

Select the operating status "off" or "on" with ▲ or ▼ and confirm with.

If "off" is selected, standby operation is activated after a mains interruption.

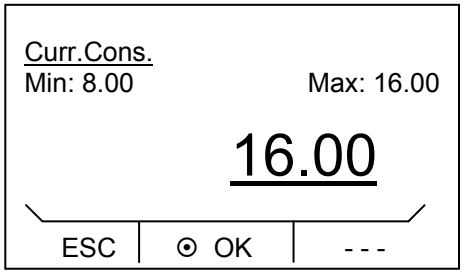
With the setting "on" the device continues running straight after the mains interruption.

*By pressing ◀ or ▰ (ESC) you are returned to the menu level without changes.*

## 12.6 Limiting the mains current consumption

If your mains fusing is below 16 A, the current consumption can be reduced in steps from 16 A to 8 A. The maximum heating power is reduced correspondingly. Here, take into consideration whether other loads are connected to the same fused circuit or whether your ECO thermostat is the only load.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key.

Selection and confirmation of → Setup → Basic setup. → Curr.Consumpt..

The entry window appears.

Change the value with ▲ or ▼.

Single figures can be selected by pressing ◀ or ▶.

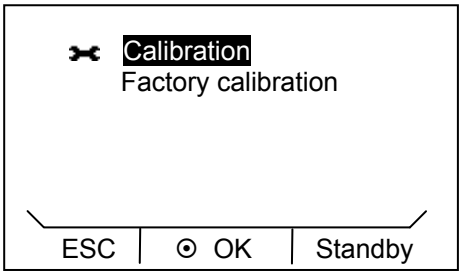
Confirm the entry with the enter key.

*By pressing ▰ (ESC) you are returned to the menu level without changes.*

## 12.7 Entering the offset of the displayed temperature (calibration)

Deviations to calibrated reference thermometers (e.g. LAUDA DigiCal) can be internally corrected with the "Offset" function.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key.

Selection and confirmation of → Setup → Calibration.

The adjacent menu window appears.

Select Calibration with ▲ or ▼ and confirm with.

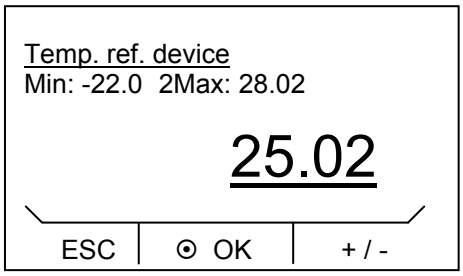
The entry window appears. The value indicated on the reference thermometer must be entered as the value.

Change the value with ▲ or ▼.

Single figures can be selected by pressing ◀ or ▶.

By pressing (+/-) the arithmetic sign can be changed.

You confirm the set value by pressing.

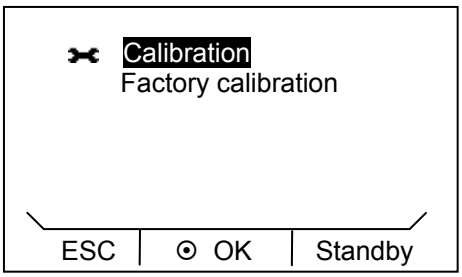



*By pressing (ESC) you are returned to the menu level without changes.*

## 12.8 Restoring the factory setting of the internal temperature sensor (factory calibration)

If the offset has been adjusted, the factory setting (factory calibration) can be restored again.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key.

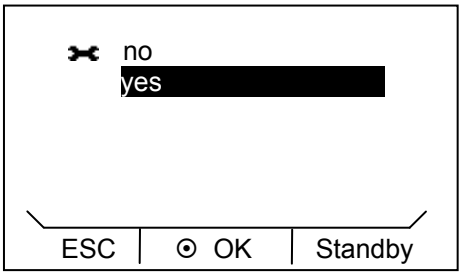
Selection and confirmation of → Setup → Calibration.

The adjacent menu window appears.

Select and confirm "Factory Calibration" with ▲ or ▼ and.

The adjacent menu window appears.

Select "yes" using ▲ or ▼ and confirm with to restore the factory settings.




*With "no", (ESC), or ◀ you are returned to the menu level without changes.*

# 13 List of "Alarm and warning codes"

Alarms

| Alarm code | | Meaning |
|---|---|---|
| **1** | Low Level Pump | Pump runs too fast (low level) |
| **2** | Low Level Pump | Low level in the float |
| **3** | Overtemperature | Overtemperature (t> Tmax) |
| **4** | Pump blocked | Pump blocked standstill |
| **5** | Connection Command | Remote control unit command triggered in running operation |
| **9** | T ext Pt100 | External Pt100 actual value is not present. |
| **10** | T ext analog | External analog actual value is not present. |
| **11** | T ext serial | External serial actual value is not present. |
| **12** | Input Analog 1 | Analog module: Current interface 1, interruption |
| **13** | Input Analog 2 | Analog module: Current interface 2, interruption |
| **15** | Digital Input | Error on digital input |

Warnings

| Code | 0XX Control system | Meaning | Code | 3XX SmartCool | Meaning |
|---|---|---|---|---|---|
| **1** | CAN receive overf | Overflow during CAN reception | **1** | CAN receive overf | Overflow during CAN reception |
| **2** | Watchdog Reset | Watchdog reset | **2** | Watchdog Reset | Watchdog reset |
| **3** | T_il limit active | til limit active | **3** | adaption missing | No adaption run |
| **4** | T_ih limit active | tih limit active | **4** | Pressure switch activated | Pressure switch in cooling circuit triggered |
| **5** | corrupt parameter | inadmissible internal parameter | **5** | Clean condenser | Clean condenser |
| **6** | corrupt progr | inadmissible programmer data | **6** | TO1 range Klixon | Injection temperature outside value range |
| **7** | Invalid Parameter | inadmissible parameter in memory | **7** | Invalid Parameter | inadmissible parameter in memory |
| **8** | CAN system | Problem during internal data interchange | **8** | CAN system | Problem during internal data interchange |
| **9** | Unknown module | Unknown module connected | **9** | Unknown Module | Unknown module connected |
| **10** | SW control too old | Software version of control panel too old | **10** | SW control too old | Software version of control panel too old |
| **11** | SW safety too old | Software version of protection too old | **11** | SW safety too old | Software version of protection too old |
| **12** | SW command too old | Software version of command remote control unit too old | **12** | SW command too old | Software version of command remote control unit too old |
| **13** | SW cool too old | Software version of cooling module too old | **13** | SW cool too old | Software version of cooling module too old |
| **14** | SW analog too old | Software version of analog too old | **14** | SW analog too old | Software version of analog too old |
| **15** | SW serial too old | Software version of RS232 too old | **15** | SW serial too old | Software version of RS232 too old |
| **16** | SW contact old | Software version of contact module too old | **16** | SW contact old | Software version of contact module too old |
| **17** | SW Valve 0 old | Software version of solenoid valve 0 too old | **17** | SW Valve 0 old | Software version of solenoid valve 0 too old |
| **18** | SW Valve 1 old | Software version of solenoid valve 1 too old | **18** | SW Valve 1 old | Software version of solenoid valve 1 too old |
| **19** | SW Valve 2 old | Software version of solenoid valve 2 too old | **19** | SW Valve 2 old | Software version of solenoid valve 2 too old |
| **20** | SW Valve 3 old | Software version of solenoid valve 3 too old | **20** | SW Valve 3 old | Software version of solenoid valve 3 too old |
| **21** | SW Valve 4 old | Software version of solenoid valve 4 too old | **21** | SW Valve 4 old | Software version of solenoid valve 4 too old |
| **26** | SW HTC old | Software version of high temperature cooler too old | **26** | SW HTC old | Software version of high temperature cooler too old |
| **27** | SW Ext Pt100 old | Software version of external Pt100 too old | **27** | SW Ext Pt100 old | Software version of external Pt100 too old |
| **33** | RTC wrong data | Internal clock defective | **33** | valve sm0 break | Cable of injection valve 0 defective |
| **41** | wrong net voltage | Incorrect mains voltage setting | **34** | valve sm1 break | Cable of injection valve 1 defective |
| **42** | no eco type | Device type not configured | **35** | valve sm2 break | Cable of injection valve 2 defective |
| **43** | no eco voltage | Mains voltage not configured | **36** | valve sm3 break | Cable of injection valve 3 defective |
| **44** | chiller missing | Chiller not running | **37** | output sm0 | Triggering of injection valve 0 defective |
| **45** | Diff.voltages | Different mains voltage configured (head and cooling underpart) | **38** | output sm1 | Triggering of injection valve 1 defective |
| | | | **39** | output sm2 | Triggering of injection valve 2 defective |
| | | | **40** | output sm3 | Triggering of injection valve 3 defective |
| | | | **41** | sm0 min too small | Start value of injection valve too small |
| | | | **42** | no eco type | Device type not configured |
| | | | **43** | no eco voltage | Mains voltage not configured |
| | | | **44** | chiller missing | Chiller not running |

| Code | 1XX Safety system | Meaning | Code | 2XX Command | Meaning |
|---|---|---|---|---|---|
| 1 | CAN receive overf | Overflow during CAN reception | 1 | CAN receive overf | Overflow during CAN reception |
| 2 | Watchdog Reset | Watchdog reset | 2 | Watchdog Reset | Watchdog reset |
| 5 | Heat 1 failed | Heater 1 defective | 3 | Clock Error | Battery fault |
| 6 | Heat 2 failed | Heater 2 defective | 9 | Unknown Module | Unknown module connected |
| 7 | Invalid Parameter | inadmissible parameter in memory | 10 | SW control too old | Software version of control panel too old |
| 8 | CAN system | Problem during internal data interchange | 11 | SW safety too old | Software version of protection too old |
| 9 | Unknown Module | Unknown module connected | 12 | SW command too old | Software version of command remote control unit too old |
| 10 | SW control too old | Software version of control panel too old | 13 | SW cool too old | Software version of cooling module too old |
| 11 | SW safety too old | Software version of protection too old | 14 | SW analog too old | Software version of analog too old |
| 12 | SW command too old | Software version of command remote control unit too old | 15 | SW serial too old | Software version of RS232 too old |
| 13 | SW cool too old | Software version of cooling module too old | 16 | SW contact old | Software version of contact module too old |
| 14 | SW analog too old | Software version of analog too old | 17 | SW Valve 0 old | Software version of solenoid valve 0 too old |
| 15 | SW serial too old | Software version of RS232 too old | 18 | SW Valve 1 old | Software version of solenoid valve 1 too old |
| 16 | SW contact old | Software version of contact module too old | 19 | SW Valve 2 old | Software version of solenoid valve 2 too old |
| 17 | SW Valve 0 old | Software version of solenoid valve 0 too old | 20 | SW Valve 3 old | Software version of solenoid valve 3 too old |
| 18 | SW Valve 1 old | Software version of solenoid valve 1 too old | 21 | SW Valve 4 old | Software version of solenoid valve 4 too old |
| 19 | SW Valve 2 old | Software version of solenoid valve 2 too old | 26 | SW HTC old | Software version of high temperature cooler too old |
| 20 | SW Valve 3 old | Software version of solenoid valve 3 too old | | | |
| 21 | SW Valve 4 old | Software version of solenoid valve 4 too old | | | |
| 26 | SW HTC old | Software version of high temperature cooler too old | | | |
| 27 | SW Ext Pt100 old | Software version of external Pt100 too old | | | |

| Code | 4XX Analog module | Meaning | Code | 5XX Serial (RS232/485) | Meaning |
|---|---|---|---|---|---|
| 1 | CAN receive overf | Overflow during CAN reception | 1 | CAN receive overf | Overflow during CAN reception |
| 2 | Watchdog Reset | Watchdog reset | 2 | Watchdog Reset | Watchdog reset |
| 9 | Unknown Module | Unknown module connected | 9 | Unknown Module | Unknown module connected |
| 10 | SW control too old | Software version of control panel too old | 10 | SW Contr. too old | Software version of control panel too old |
| 11 | SW safety too old | Software version of protection too old | 11 | SW safety too old | Software version of protection too old |
| 12 | SW command too old | Software version of command remote control unit too old | 12 | SW command too old | Software version of command remote control unit too old |
| 13 | SW cool too old | Software version of cooling module too old | 13 | SW cool too old | Software version of cooling module too old |
| 14 | SW analog too old | Software version of analog too old | 14 | SW analog too old | Software version of analog too old |
| 15 | SW serial too old | Software version of RS232 too old | 15 | SW serial too old | Software version of RS232 too old |
| 16 | SW contact old | Software version of contact module too old | 16 | SW contact old | Software version of contact module too old |
| 17 | SW Valve 0 old | Software version of solenoid valve 0 too old | 17 | SW Valve 0 old | Software version of solenoid valve 0 too old |
| 18 | SW Valve 1 old | Software version of solenoid valve 1 too old | 18 | SW Valve 1 old | Software version of solenoid valve 1 too old |
| 19 | SW Valve 2 old | Software version of solenoid valve 2 too old | 19 | SW Valve 2 old | Software version of solenoid valve 2 too old |
| 20 | SW Valve 3 old | Software version of solenoid valve 3 too old | 20 | SW Valve 3 old | Software version of solenoid valve 3 too old |
| 21 | SW Valve 4 old | Software version of solenoid valve 4 too old | 21 | SW Valve 4 old | Software version of solenoid valve 4 too old |
| 26 | SW HTC old | Software version of high temperature cooler too old | 26 | SW HTC old | Software version of high temperature cooler too old |
| 27 | SW Ext Pt100 old | Software version of external Pt100 too old | 27 | SW Ext Pt100 old | Software version of external Pt100 too old |

| Code | 6XX Switching contacts | Meaning | Code | 7, 8, 9, 10, 11, 16XX Solenoid valve | Meaning |
|---|---|---|---|---|---|
| 1 | CAN receive overf | Overflow during CAN reception | 1 | CAN receive overf | Overflow during CAN reception |
| 2 | Watchdog Reset | Watchdog reset | 2 | Watchdog Reset | Watchdog reset |
| 9 | Unknown Module | Unknown module connected | 3 | No cooling liquid | No cooling liquid present (HTC) |
| 10 | SW Contr. too old | Software version of control panel too old | 6 | no unfill liquid too hot | No draining, because bath temperature is too hot (HTC) |
| 11 | SW safety too old | Software version of protection too old | 9 | Unknown Module | Unknown module connected |
| 12 | SW command too old | Software version of command remote control unit too old | 10 | SW Contr. too old | Software version of control panel too old |
| 13 | SW cool too old | Software version of cooling module too old | 11 | SW safety too old | Software version of protection too old |
| 14 | SW analog too old | Software version of analog too old | 12 | SW command too old | Software version of command remote control unit too old |
| 15 | SW serial too old | Software version of RS232 too old | 13 | SW cool too old | Software version of cooling module too old |
| 16 | SW contact old | Software version of contact module too old | 14 | SW analog too old | Software version of analog too old |
| 17 | SW Valve 0 old | Software version of solenoid valve 0 too old | 15 | SW serial too old | Software version of RS232 too old |
| 18 | SW Valve 1 old | Software version of solenoid valve 1 too old | 16 | SW contact old | Software version of contact module too old |
| 19 | SW Valve 2 old | Software version of solenoid valve 2 too old | 17 | SW Valve 0 old | Software version of solenoid valve 0 too old |
| 20 | SW Valve 3 old | Software version of solenoid valve 3 too old | 18 | SW Valve 1 old | Software version of solenoid valve 1 too old |
| 21 | SW Valve 4 old | Software version of solenoid valve 4 too old | 19 | SW Valve 2 old | Software version of solenoid valve 2 too old |
| 26 | SW HTC old | Software version of high temperature cooler too old | 20 | SW Valve 3 old | Software version of solenoid valve 3 too old |
| 27 | SW Ext Pt100 old | Software version of external Pt100 too old | 21 | SW Valve 4 old | Software version of solenoid valve 4 too old |
| | | | 26 | SW HTC old | Software version of high temperature cooler too old |
| | | | 27 | SW Ext Pt100 old | Software version of external Pt100 too old |

| Code | 17XX Pt100/LiBus module | Meaning |
|---|---|---|
| 1 | CAN receive overf | Overflow during CAN reception |
| 2 | Watchdog Reset | Watchdog reset |
| 3 | Ext_Pt_short | Line short on external Pt100 |
| 7 | Invalid Parameter | inadmissible parameter in memory |
| 8 | CAN system | Problem during internal data interchange |
| 9 | Unknown Module | Unknown module connected |
| 10 | SW Contr. too old | Software version of control panel too old |
| 11 | SW safety too old | Software version of protection too old |
| 12 | SW command too old | Software version of command remote control unit too old |
| 13 | SW cool too old | Software version of cooling module too old |
| 14 | SW analog too old | Software version of analog too old |
| 15 | SW serial too old | Software version of RS232 too old |
| 16 | SW contact old | Software version of contact module too old |
| 17 | SW Valve 0 old | Software version of solenoid valve 0 too old |
| 18 | SW Valve 1 old | Software version of solenoid valve 1 too old |
| 19 | SW Valve 2 old | Software version of solenoid valve 2 too old |
| 20 | SW Valve 3 old | Software version of solenoid valve 3 too old |
| 21 | SW Valve 4 old | Software version of solenoid valve 4 too old |
| 26 | SW HTC old | Software version of high temperature cooler too old |
| 27 | SW Ext Pt100 old | Software version of external Pt100 too old |

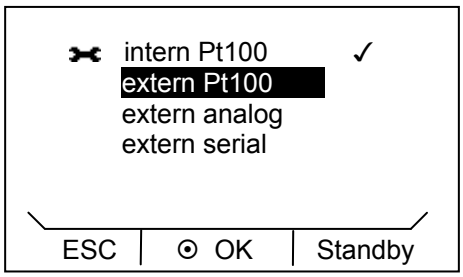
# 14 External control

The devices can also be controlled via an external Pt100 temperature sensor, which can be connected at the back of the control head. It is necessary to install an external Pt100/LiBus module (⇨ 17) for external control. The module is available as an accessory (⇨ 9).

Furthermore, the signal coming from an analog or serial module can also be controlled. Analog module and contact modules are available as accessories (⇨ 9).

## 14.1 Activating external control (external Pt100)

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key ●.

Selection and confirmation of → Setup → Control → Contr. Variable.

The adjacent menu window appears.

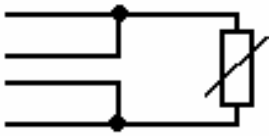
The menu item extern Pt100 only appears when the module for an external connection is available. A temperature sensor has to be connected to the module.

Select and confirm extern Pt100 with ▲ or ▼ and ●.

*By pressing ◀ or ▰ (ESC) you are returned to the menu level without changes.*

**Connection of the external Pt100 to Lemo socket 10 S**

| Contact | | | |
|---|---|---|---|
| 1 | + | I | Current path |
| 2 | + | U | Voltage path |
| 3 | - | U | Voltage path |
| 4 | - | I | Current path |



Pt 100
DIN EN 60751

4-pole Lemosa plug for Pt100 connection (order no. EQS 022)

**Note:**

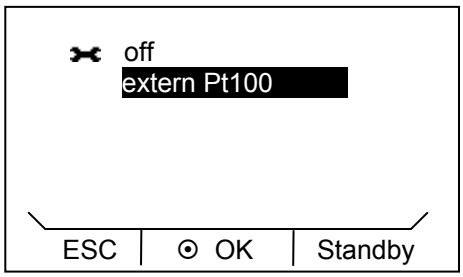
Only use screened connecting leads and connects the screen to the plug housing.

## 14.2 Setpoint offset operating mode (Diff. set/actual)

It is possible to apply an offset value to the temperature, which is provided by an external temperature sensor and to process it as the set value.

The bath temperature can therefore be operated, for example, below the temperature of a reactor measured by the external temperature sensor.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key ●.

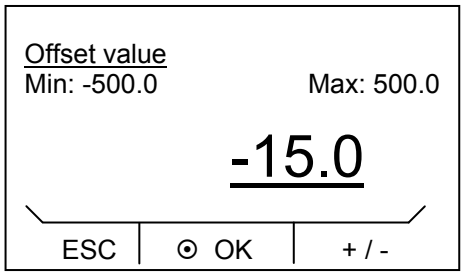
Selection and confirmation of → Setup → Control → Setpoint offset. → Offset source.

The adjacent menu window appears.

Select and confirm the setpoint source with ▲ or ▼ and ●.

The setpoint offset is deactivated with "off".

The entry window appears on selecting the menu point Diff.set/actual.




The minimum and maximum possible offset values and the current offset value are displayed.

Change the value with ▲ or ▼.

Single figures can be selected by pressing ◀ or ▶.

By pressing (+/-) the arithmetic sign can be changed.

Confirm your choice with the enter key ●.

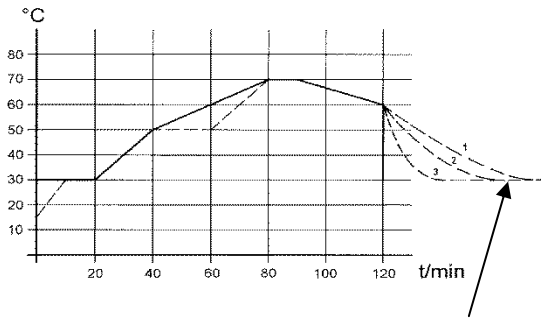
*By pressing (ESC) you are returned to the menu level without changes.*

# 15 Programmer

The programming function enables you to save a temperature/time program. The program consists of a number of temperature/time segments and details about their repetition (loops). The total number of freely programmable segments is 20. Temperature step changes (time is zero) or also temperature retention phases for the same start and end temperatures in the segment are possible. On starting the current set value is taken as the starting value of the first segment.

Changes to the pump level are entered in the relevant line. If the pump level is to remain unchanged, "0" is entered (display shows "---")

## 15.1 Programming example




The graph shows as an example the reprogramming of a set-point temperature trace.

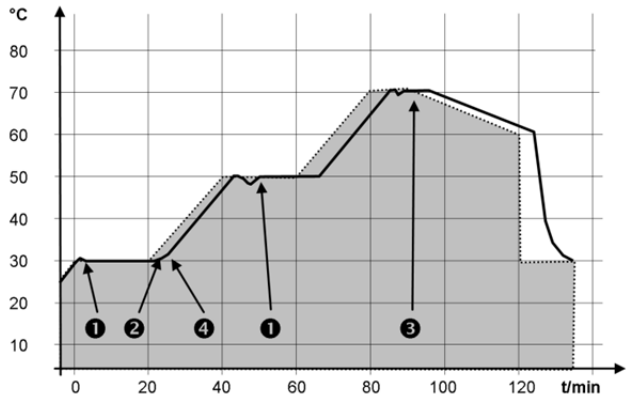
Cooling time dependent on device type, load, etc.

Example seg. no. 2: ➡ "reach 50°C within 20 minutes"

The original values ("before" table) are illustrated with a continuous line and the edited trace ("after" table) with a broken line.
In the edited table a new segment ① has been entered, and the segment time ②, tolerance ③ and pump level ④ have been changed (⇨ 15.2).

| before (____) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Tend | hh:mm | Tol. | | Pmp | S1 | S2 | S3 |
| 1 | 30.00 | ---- | 0.1 | 1 | 2 | off | off | off |
| 2 | 50.00 | 0:20 | 0.0 | 2 | 2 | off | off | off |
| 3 | 70.00 | 0:40 | 0.0 | 3 | 3 | off | off | off |
| 4 | 70.00 | 0:10 | 0.1 | 4 | 4 | off | off | off |
| 5 | 60.00 | 0:30 | 0.0 | 5 | 2 | off | off | off |
| 6 | 30.00 | 0:00 | 0.0 | 6 | 2 | off | off | off |

| after (- - - -, edited) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Tend | hh:mm | Tol. | | Pmp | S1 | S2 | S3 |
| 1 | 30.00 | ---- | 0.1 | 1 | 2 | off | off | off |
| 2 | 50.00 | 0:20 | 0.0 | 2 | 2 | off | off | off |
| **3 ①** | **50.00** | **0:20** | **0.1** | 3 | 3 | off | off | off |
| 4 | 70.00 | **0:20②** | 0.0 | 4 | 4④ | off | off | off |
| 5 | 70.00 | 0:10 | **0.8③** | 5 | 2④ | off | off | off |
| 6 | 60.00 | 0:30 | 0.0 | 6 | 2 | off | off | off |
| 7 | 30.00 | 0:00 | 0.0 | 7 | 2 | off | off | off |




The tolerance entry can have a large effect with external bath control. The adjacent graph of the edited trace shows the possible run-on of the actual temperature in the bath vessel (continuous line) for the set-point temperature of the programmer (highlighted in gray).

Note:

– The tolerance field facilitates exact conformance to the dwell time at a specified temperature. The following segment is only processed when the actual temperature reaches the tolerance band ❶, so that for example the ramp of segment 2 is only started delayed at ❷.

– A tolerance range which is too tight can however also cause undesired delays. **In particular with external control** the range should not be chosen too tightly. In Segment 5 a larger tolerance has been entered, so that the desired time of ten minutes is maintained even with settling action ❸.
– Only flat (slow) ramps should be programmed where necessary with a tolerance range. Steep ramps which lie close to the maximum possible heating or cooling rates of the thermostat may be severely delayed by a tolerance range that is too tight (here in Segment 2) ❹.

**Note:**

No time specification is possible in the start segment (no.1). The temperature of the first segment is attained as quickly as possible in order to switch to segment 2 after reaching the set tolerance.

## 15.2 Creating and editing a program

The following functions are explained below:

- Creating and editing a program.
- Insert or append a new segment.
- Delete a segment.

**Note:**

– New segments can be inserted and existing ones changed, even when a program is currently being executed. Furthermore, except for the currently active segment, all segments can be deleted at any time.
– Changes to the currently running segment are possible. The segment is continued as though the change has been valid since the start of the segment.
– If the new segment time is shorter than the already expired segment time, then the program skips to the next segment.
– If a segment time is required > 999h:59 min, then this time must be spread over several consecutive segments.

Creating and editing a program.

Compare programming example (⇨ 15.1)

| | Tend | hh:mm | Tol. |
|---|---|---|---|
| 1 | 35.00 | --:-- | 0.1 |
| 2 | 40.00 | 0:10 | 0.1 |
| 3 | 50.00 | 0:20 | 0.0 |
| 4 | 70.00 | 0:50 | 0.1 |

ESC | ⊙ new | delete

| | Pmp | S1 | S2 | S3 |
|---|---|---|---|---|
| 1 | 1 | on | - - - | off |
| 2 | 1 | on | - - - | off |
| 3 | 2 | on | - - - | off |
| 4 | 2 | on | - - - | off |

ESC | ⊙ OK | - - -

You access the editor view of the programmer by selecting and confirming → Programmer → Edit. To view the complete window information go to the right with ▶.

With the keys ▲, ▼, ◀ and ▶ you obtain access to the individual segment fields.

If the cursor is located in the first column, the functions "new" and "delete" are visible in the soft-key bar. Program steps can be created or deleted in this way.

With all other cursor positions the function "OK" is visible in the soft-key bar.

Using ⊙ (OK) you can select the appropriate parameters and change them with ▲ or ▼.

You can quit the edit window without changes using ▰ (ESC). When the cursor is located on a segment number, using ◀ you return to the menu level of the programmer without changes.

**Note:**

No time specification is possible in the start segment. The temperature of the first segment is attained as quickly as possible in order to switch to segment 2 after reaching the set tolerance.

The programmer edit window contains the following parameters:

The segment number of the program is located in the first column.

**Tend**: Final temperature to be attained

**hh:mm**: Time in hours (hh) and minutes (mm) in which the specified temperature is to be attained.

*If the value "0:00" is entered in the field "hh:mm", the set value is accepted immediately and the bath temperature approached as quickly as possible.*

**Tol.**: Tolerance defines how exactly the final temperature is to be attained before the next segment is processed.

If the tolerance range is selected too small in the "Tol." field, the program might not continue, because the required tolerance is not achieved.

**Pmp**: Pump level at which the segment is to be processed.

**S1, S2, S3**: Switching contacts of the contact module (if present) can be programmed here. Contact modules are available as accessories (⇨ 9). The setting "- -" stands for no change to the preceding segment, i.e. if "- -" is present in all fields, the contact setting of the start setup or that before the program start is retained.

Inserting a new segment

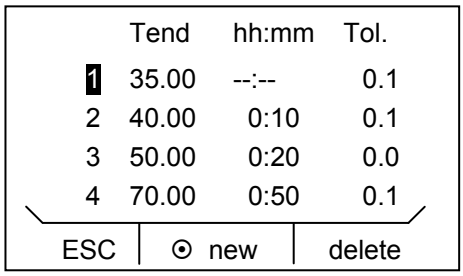
| | Tend | hh:mm | Tol. |
|---|---|---|---|
| 1 | 35.00 | --:-- | 0.1 |
| 2 | 40.00 | 0:10 | 0.1 |
| 3 | 50.00 | 0:20 | 0.0 |
| 4 | 70.00 | 0:50 | 0.1 |

ESC | ⊙ new | delete

With ▲ or ▼ go to the segment number under which the new segment is to be inserted.

The new segment is inserted on pressing ⊙ (new). You can edit it as described above.

Deleting a segment

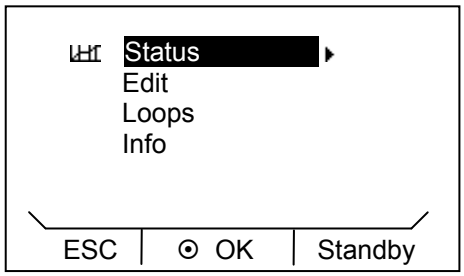


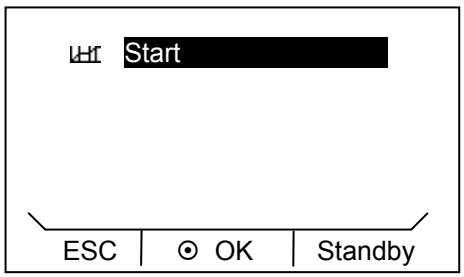

Go to the segment to be deleted with ▲ or ▼.

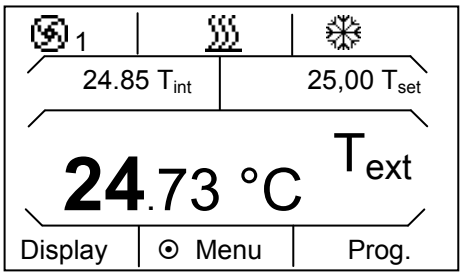
The corresponding segment is deleted on pressing (delete).

## 15.3 Starting the program

You activate the soft-key bar by pressing any key.




The submenu Status appears by selecting and confirming → Programmer.

With the menu Status you can execute the following commands

| | |
|---|---|
| Start | Start program |
| Hold | Hold program |
| Continue | Continue program |
| Stop | Terminate program |

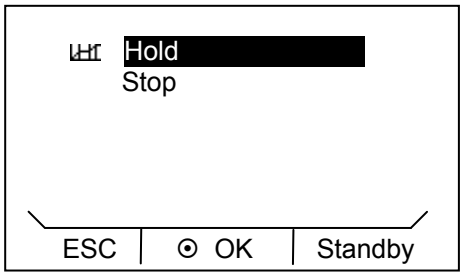
by pressing the enter key.

You can also pause the programmer with (Standby). When "Standby" is deactivated, the programmer continues running.

Instructions which cannot be executed due to the situation are not displayed. Continue therefore only appears if Hold has been activated.

If the programmer is in operation, with an active soft-key bar this is indicated at the lower right.

## 15.4 Interrupting, continuing or terminating the program

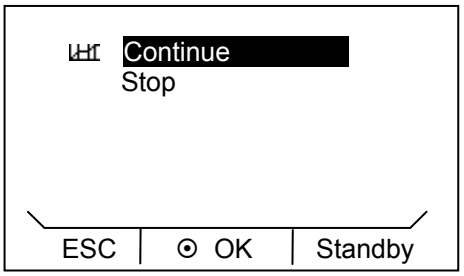



After the program start the menu points Hold and Stop are displayed.

The options can be selected with ▲ or ▼.

| | |
|---|---|
| Hold | Interrupt program |
| Stop | Terminate program. |

Confirm with the enter key ●.




To continue a program held by Hold

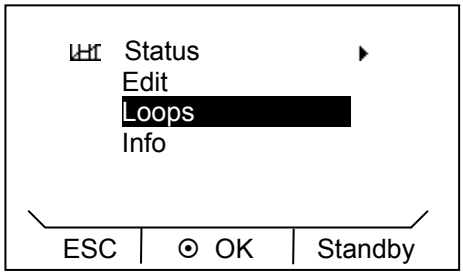
Select the option Continue with ▲ or ▼.

Confirm your choice with the enter key ●.

Also ◄ (Standby) holds the programmer. Pump, heating and chiller are here switched off.

When ◄ (Standby) is pressed again, the programmer returns to the previously selected operating mode (Hold or active operation):

## 15.5 Defining the number of program loops (Loops)



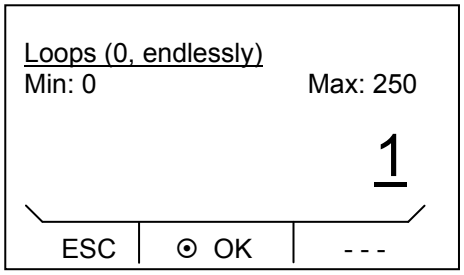

Programs can be processed many times.

The submenu → Loops appears by selecting and confirming → Programmer.

Select and confirm Loops with ▲ or ▼ and ●.

Enter the desired number with ▲ or ▼.

Confirm your choice with the enter key ●.




Note: To enter two or three-figure numbers move the cursor to the appropriate point and change the figures with ▲or ▼.

If "0" is entered, the program is continuously repeated.

*By pressing ◄ (ESC) you are returned to the menu level without changes.*

# 16 Control parameters

The control parameters have been optimized at the factory for operation as a bath thermostat (with water as the heat transfer medium) with internal control. The standard parameters are already preset for thermostatic stabilization with external control.

Depending on the application, the configuration can be adapted from case to case as required. Also the thermal capacity and the viscosity of the heat transfer medium affect the control behavior.

Note: *Only change the control parameters if you have sufficient knowledge of control techniques.*

## 16.1 Internal control variable (internal temperature sensor)

If you have not connected any temperature sensor, read further here. For activated external control read (⇨ 16.2).

The control compares the set-point temperature with the current bath temperature and calculates the set value for heating or cooling.

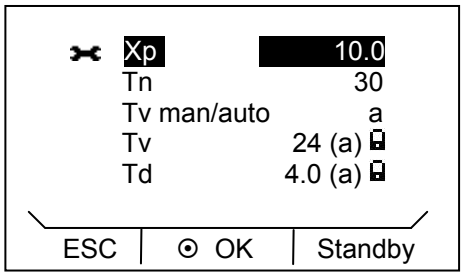
These control parameters can be set:

| Description | Short form | Unit |
|---|---|---|
| Proportional range | Xp | K |
| Reset time | Tn | s |
| Derivative time | Tv | s |
| Damping | Td | s |

If "Tv manual/auto" is set to "a" (automatic), Tv and Td cannot be changed. They are in this case derived from Tn with fixed factors.

Consider the effect of the temperature limits Tih and Til (⇨ 7.4.5) on the control.

You activate the soft-key bar by pressing any key.



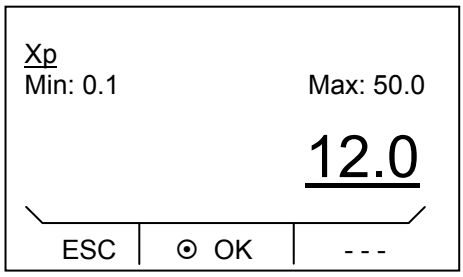

Access to the main menu level is obtained by pressing the enter key ●.

Selection and confirmation of → Setup → Control → Contr.parameter → intern Pt100.

The adjacent menu window appears. Apart from the control parameters the currently set values are displayed.

Under the menu point "Tv man/auto" you can select between manual and automatic entry using ●.

The selection is indicated in the menu line by a (automatic) or m (manual). If "automatic" is selected, the entry is blocked for the parameters Tv and Td.




Select and confirm parameters with ▲ or ▼ and ⊙.

The respective edit window appears with Min and Max figures for the parameter values Xp, Tn, Tv and Td.

Change the value with ◀ or ▶.

Single figures can be selected by pressing ▲ or ▼.

Confirm your choice with the enter key ⊙.

*By pressing ▬ (ESC) you are returned to the menu level without changes.*

## 16.2 External control variable

The setting options illustrated in this section are only possible with a connected external temperature sensor or with an existing module (as activated as control variable in Section 14) for reading in the actual temperature.

The control system for external actual values is realized as a two-stage cascade controller to improve the response to setpoint changes. From the temperature setpoint and the external temperature, which is generally measured by the external Pt100, a "master controller" determines the "internal setpoint" which is passed to the slave controller. Its set value controls the heating and cooling.

**Correcting quantity limit**

If a step change in set-point temperature is specified, the optimum control might set an outflow temperature which is substantially higher than the temperature desired on the external vessel. With the correction limitation the maximum permissible deviation between the temperature on the external load and the outflow temperature can be limited. The limit can be set via a menu point. 0

These parameters can be set on the master controller (PIDT or external controller):

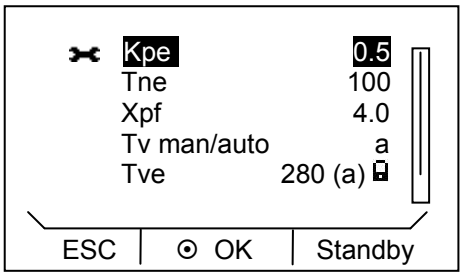
| Description | Short form | Unit |
|---|---|---|
| Gain | Kpe | - |
| Proportional range | Prop_E | K |
| Reset time | Tne | s |
| Derivative time | Tve | s |
| Damping time | Tde | s |

These parameters can be set on the slave controller (P-controller):

| Description | Short form | Unit |
|---|---|---|
| Proportional range | Xpf | K |

If "Tv manual/auto" is set to "automatic", Tve, Tde and Prop_E cannot be changed. Tve and Tde are in this case derived from Tne with fixed factors.

You activate the soft-key bar by pressing any key.




Access to the main menu level is obtained by pressing the enter key.

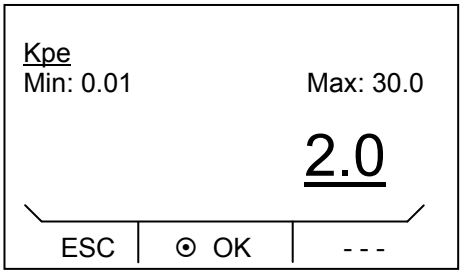
Selection and confirmation of → Setup → Control → Contr.parameter → extern Pt100.

The adjacent menu window appears. Apart from the control parameters the currently set values are displayed.

Under the menu point "Tv man/auto" you can select between manual and automatic entry using.

The selection is indicated in the menu line by "a" (automatic) or "m" (manual). If "automatic" is selected, the entry is blocked for the parameters Tv and Td.

Select and confirm parameters with ▲ or ▼ and.




The respective edit window appears with Min and Max figures for the parameter values Kpe, Tne, Tve, Tde and Xpf.

Change the value with ▲ or ▼.

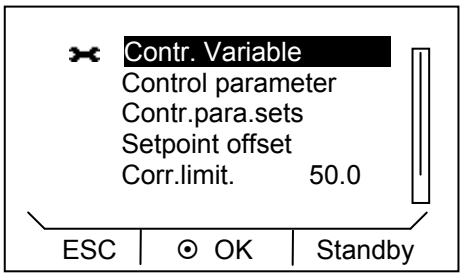
Single figures can be selected by pressing ◀ or ▶.

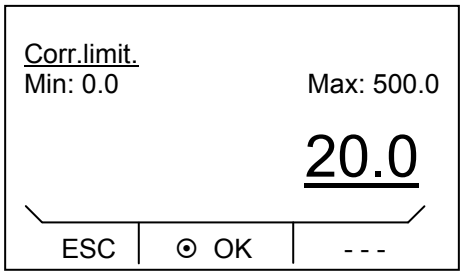
Confirm your choice with the enter key.

*By pressing ◤ (ESC) you are returned to the menu level without changes.*

### 16.2.1 Setting the correction limitation

You activate the soft-key bar by pressing any key.




Access to the menu level is obtained by pressing ●.

Selection and confirmation of → Setup → Control.

The adjacent menu window appears.

Select and confirm Corr.limit. with ▲ or ▼ and ●.

The adjacent menu window appears. The minimum and maximum possible values and the current value are displayed.

Change the value with ▲ or ▼.

Single figures can be selected by pressing ◀ or ▶.

Confirm your choice with the enter key ●.

By pressing ▬ *(ESC) you are returned to the menu level without changes*.

### 16.2.2 Procedure for setting the control parameters for external control

1. Activating external control (⇨ 14.1).
2. Set the slave controller:

2.1. Parameter to auto ; Xpf in dependence of:

- Check or adjust device type (⇨ 8.2.4).
- Select heat transfer liquid with as low-viscosity and with as high a thermal capacity as possible.
  Ranking list: Water, water/glycol
- Set pump level as high as possible,
- Ensure adequate circulation,

2.2. Set Xpf:

- With a tendency to oscillate with a short period of oscillation (e.g. 30 s) ➔ Xpf smaller, otherwise larger,
- with poor thermal coupling and a large mass needing temperature stabilization ➔ large (e.g. 2...5, possibly even larger),
- with good thermal coupling and a small mass to be stabilized in temperature ➔ small (e.g. 0.2..., 0.7),

3. Setting the master controller (PID controller):

- First start with Auto, then possibly continue with manual.

3.1. Setting Kpe:

- With a tendency to oscillate (long period of oscillation, e.g. 10 min) ➔ Kpe larger, otherwise smaller,

3.2. Setting Tne/ Tve/ Tde:

- Generally quite high values (Tne = 70 s ... 200 s; Tve = 50 s ... 150 s),
- with smaller values ➔ faster transient responses, otherwise slower transient responses and therefore less oscillation,
- Tve: To reduce transients ➔ increase Tve, otherwise vice versa,

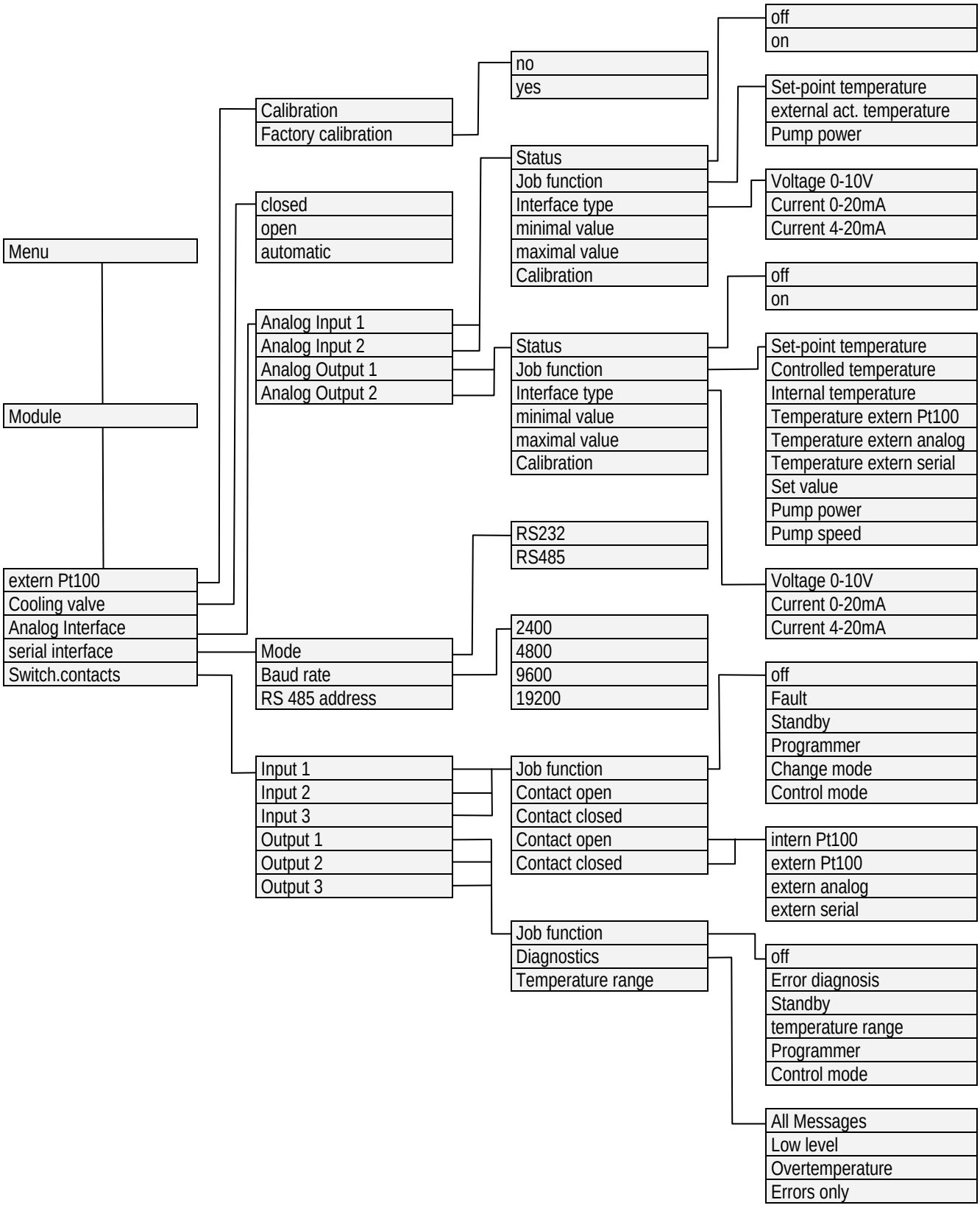
- Tde (damping for Tve): generally approx. 10% of Tve.

4. Correction limitation (⇨ 016.2.1) and temperature limits (Til/Tih) (⇨ 7.4.5).
   - Set according to the physical boundary conditions.

# 17 Interface modules

## 17.1 Menu structure of the modules

All existing menu points are shown. Modules and menu points which cannot be realized are however masked out. More extensive information can be found in the following sections.



## 17.2 Analog module

Analog Module (LAUDA order no. LRZ 912) has two inputs and two outputs, which are brought out to a six-pole DIN socket to Namur Recommendation (NE28).

The inputs and outputs can be set independently of one another as a 0...20 mA, 4...20 mA and 0...10 V interface. Various functions can be selected for the inputs and outputs. Accordingly, the signal on the input is interpreted differently and different information appears on the output.

In addition the interfaces can be freely scaled according to the set function.

20 V DC is available for measurement transducers.

The following values can be defined via the inputs:

| | |
|---|---|
| Setpoint Value | Setpoint temperature |
| Ext. Actual temperature | External actual temperature |
| Pump power | Pump power |

The following values can be output via the outputs:

| | |
|---|---|
| Setpoint value | Setpoint temperature |
| Controlled temperature | The temperature to which the system is being controlled |
| Internal temp. | Actual temperature (bath temperature) |
| Temp.extern Pt100 | External actual temperature of Pt100 |
| Temp.extern analog | External actual temperature of the analog input |
| Temp.extern serial | External actual temperature of the serial interface |
| Set value | Set value |
| Pump power | Pump power |
| Pump speed | Pump speed |

In addition the interfaces can be freely scaled according to the set function with minimal value and maximal value.

For example: 4 mA corresponds to 0°C and 20 mA corresponds to 100°C.

Accuracy of the inputs and outputs after calibration better than 0.1 % of full scale.

- Inputs, current — Input resistance < 100 Ohm
- Inputs, voltage — Input resistance > 50 kOhm
- Outputs, current — Burden < 400 Ohm
- Outputs, voltage — Load > 10 kOhm

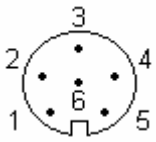
**Connection of analog inputs and outputs**

A six-pole round connector with screw lock and contact assignment according to DIN EN 60130-9 or IEC 130-9 are required.

A suitable coupling plug is obtainable under the order no. EQS 057.

View of socket (front) or solder side of plug:

**Socket 74S**




| | |
|---|---|
| Contact 1 | Output 1 |
| Contact 2 | Output 2 |
| Contact 3 | 0 V reference potential |
| Contact 4 | Input 1 |
| Contact 5 | +20 V (max. 0.1 A) |
| Contact 6 | Input 2 |

**Note:** Only use screened connecting leads and connect the screen to the plug housing.

## 17.3 RS 232/485 interface module

RS 232/485 Interface Module (order no. LRZ 913) with nine-pole SUB-D socket. Electrically isolated using optocouplers. With the LAUDA instruction set, extensively compatible to Eco-line, Proline and Integral series.

The RS 232 interface can be connected directly to the PC using a 1:1 contacted cable (order no. EKS 037, 2 m cable and EKS 057, 5 m cable).

### 17.3.1 Connecting lead and interface test RS 232

| Computer | | | | | Thermostat | | |
|---|---|---|---|---|---|---|---|
| Signal | 9-pole Sub-D socket | | 25-pole Sub-D socket | | 9-pole Sub-D socket | | Signal |
| | ① | ② | ① | ② | ① | ② | |
| R x D | 2 | 2 | 3 | 3 | 2 | 2 | T x D |
| T x D | 3 | 3 | 2 | 2 | 3 | 3 | R x D |
| DTR | 4 | | 20 | | 4 | | DSR |
| Signal Ground | 5 | 5 | 7 | 7 | 5 | 5 | Signal Ground |
| DSR | 6 | | 6 | | 6 | | DTR |
| RTS | 7 | | 4 | | 7 | | CTS |
| CTS | 8 | | 5 | | 8 | | RTS |

① with hardware handshake: On connecting a thermostat to the PC use a 1:1 and **not** a null-modem cable.

②without hardware handshake: The operating mode "Without hardware handshake" must be set on the computer/PC.

Use screened connecting leads. Connect screen to the plug housing.

The wires are electrically isolated from the rest of the electronics.

Non-assigned pins should not be connected.

The RS 232 interface can be checked in a simple way with a connected PC running Microsoft Windows operating system. With Windows® 95/98/NT/XP using the program "Hyper Terminal".

### 17.3.2 RS 232 protocol

Note the following aspects:

The interface operates with one stop bit, no parity bit and with eight data bits.

Transfer speed alternatively: 2400, 4800, 9600 (factory setting) or 19200 baud.

The RS 232 interface can be operated with or without hardware-handshake (RTS/CTS).

The command from the computer must be terminated with a CR, CRLF or LFCR.

The response from the thermostat is always terminated with a CRLF.

*CR = Carriage Return (Hex: 0D); LF = Line Feed (Hex: 0A)*

**Example:** Set-value transfer of 30.5°C to the thermostat

| Computer | Thermostat |
|---|---|
| „OUT_SP_00_30.5“CRLF | ⇨ |
| ⇦ | „OK“CRLF |

### 17.3.3 RS 485 connecting lead

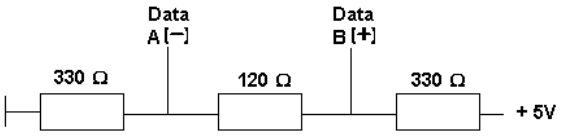
| **Thermostat** | |
|---|---|
| **9-pole Sub-D socket** | |
| Contact | Data |
| 1 | Data A (-) |
| 5 | SG (Signal Ground) optional |
| 6 | Data B (+) |

Use screened connecting leads. Connect screen to the plug housing.

The wires are electrically isolated from the rest of the electronics.

Non-assigned pins should not be connected.

An RS 485 bus requires essentially a bus termination in the form of a terminating network, which provides a defined idle state in the high impedance phases of bus operation. The bus termination is as follows:




Generally, this terminating network is integrated on the PC plug-in card (RS 485).

### 17.3.4 RS 485 protocol

Note the following aspects:

The interface operates with one stop bit, no parity bit and with eight data bits.

Transfer speed alternatively: 2400, 4800, 9600 (factory setting) or 19200 baud.

The device address always precedes the RS 485 commands. Up to 127 addresses are possible. The address must always consist of three figures (A000_... to A127_...).

The command from the computer must be terminated with a CR.

The response from the thermostat is always terminated with a CR.

*CR = Carriage Return (Hex: 0D)*

**Example:** Set-value transfer of 30.5°C to the thermostat with address 15.

| Computer | Thermostat |
|---|---|
| „A015_OUT_SP_00_30.5“CR | ⇨ |
| ⇦ | „A015_OK“CR |

## 17.4 USB interface

**Important:** First install the driver and then connect the thermostat to the PC.

### 17.4.1 Description

The ECO heating and cooling thermostats are equipped with a mini-USB interface at the back of the control head. This enables the connection of a PC and operation with the thermostat control software Wintherm Plus. In addition software updates are possible via the USB interface.

The connecting lead is not included in the items supplied.
When connecting up, make sure the correct plug is used.

Mini-USB interface

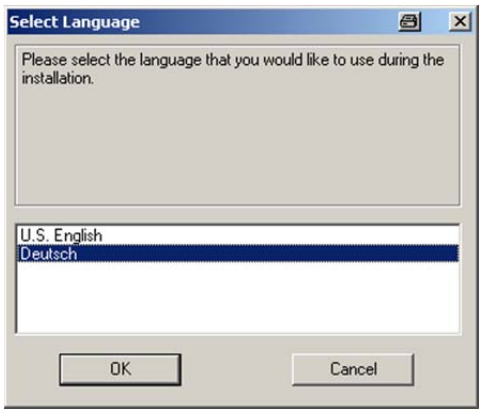
LAUDA makes the drivers specially produced for the USB interface available free of charge for download at http://www.lauda.de.

### 17.4.2 Installation of the USB driver

The driver is installed once per PC.

Supported operating systems: Windows ME, Windows XP, Windows 2000, Windows VISTA, Windows 7, Windows 8.

Execute the file "LAUDA_ECO_USB_Driver.exe". The window below opens.




1. Select the language and confirm with OK .

LAUDA eco
Willkommen im Installationsprogramm für LAUDA eco. Dieses Programm installiert LAUDA eco auf Ihrem Computer.
Wir empfehlen nachdrücklich, vor Ausführen dieses Installationsprogramms alle Windows-Programme zu beenden.
Auf Abbrechen klicken, um die Installation zu beenden und alle laufenden Programme zu schließen. Auf Weiter klicken, um mit dem Installationsprogramm zu beginnen.
WARNUNG: Dieses Programm ist urheberrechtlich sowie durch internationale Verträge geschützt.
Die unzulässige Vervielfältigung oder Verbreitung dieses Programms, ob ganz oder auszugsweise, kann schwere zivil- und strafrechtliche Konsequenzen nach sich ziehen und wird unter voller Ausschöpfung der Rechtsmittel geahndet.
Weiter>
Abbrechen

2. Key Continue.

3. Key Finish. Driver installation is installed

### 17.4.3 Connecting the thermostat to the PC

If an ECO thermostat is connected via the USB interface, it is automatically assigned to a free COM port. The PC unambiguously identifies the thermostat via a serial number internal to the thermostat and always assigns the same COM port to this thermostat. If further ECO thermostats are connected via the USB interface, these thermostats are assigned other free COM ports.

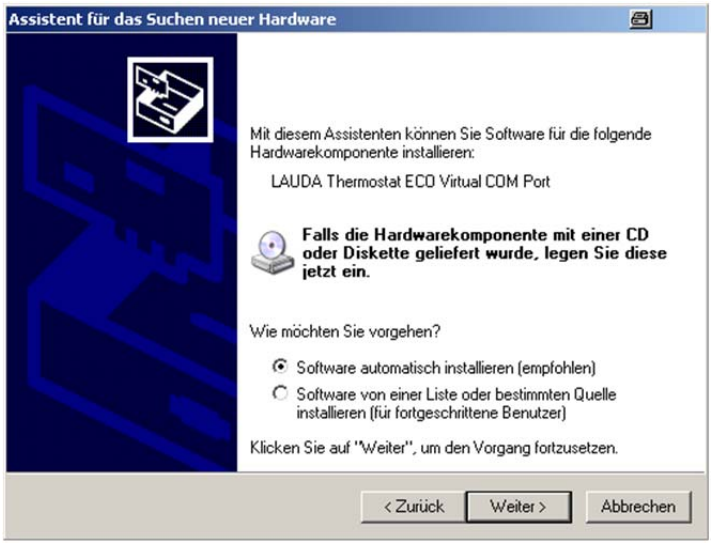
1. Plug the mini-USB cable into the control head.

2. Switch on the thermostat at the mains switch.

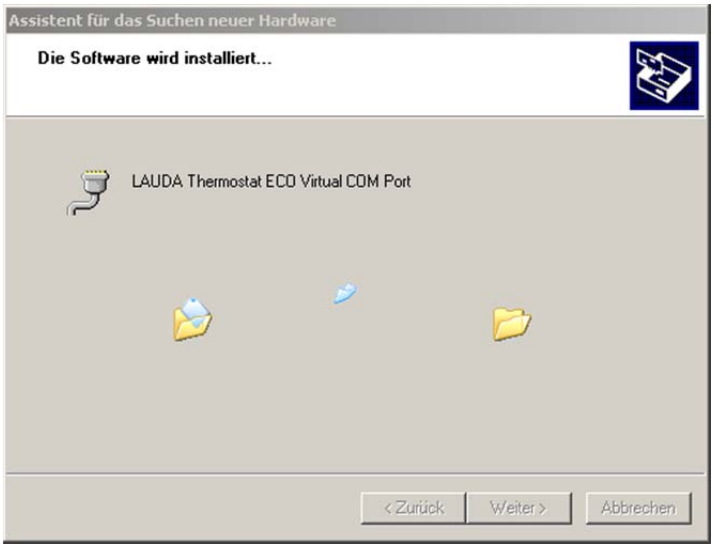
For the first time, after installation on the PC, a wizard opens to search for new hardware. Please follow the wizard instructions.

Assistent für das Suchen neuer Hardware
Willkommen
Es wird nach aktueller und aktualisierter Software auf dem Computer, auf der Hardwareinstallations-CD oder auf der Windows Update-Website (mit Ihrer Erlaubnis) gesucht.
Datenschutzrichtlinie anzeigen
Soll eine Verbindung mit Windows Update hergestellt werden, um nach Software zu suchen?
Ja, nur diese eine Mal
Ja, und jedes Mal, wenn ein Gerät angeschlossen wird
Nein, diesmal nicht
Klicken Sie auf "Weiter", um den Vorgang fortzusetzen.
< Zurück
Weiter >
Abbrechen

3. Key Continue


Assistent für das Suchen neuer Hardware
Mit diesem Assistenten können Sie Software für die folgende Hardwarekomponente installieren:
LAUDA Thermostat ECO Virtual COM Port
Falls die Hardwarekomponente mit einer CD oder Diskette geliefert wurde, legen Sie diese jetzt ein.
Wie möchten Sie vorgehen?
Software automatisch installieren (empfohlen)
Software von einer Liste oder bestimmten Quelle installieren (für fortgeschrittene Benutzer)
Klicken Sie auf "Weiter", um den Vorgang fortzusetzen.
< Zurück
Weiter >
Abbrechen

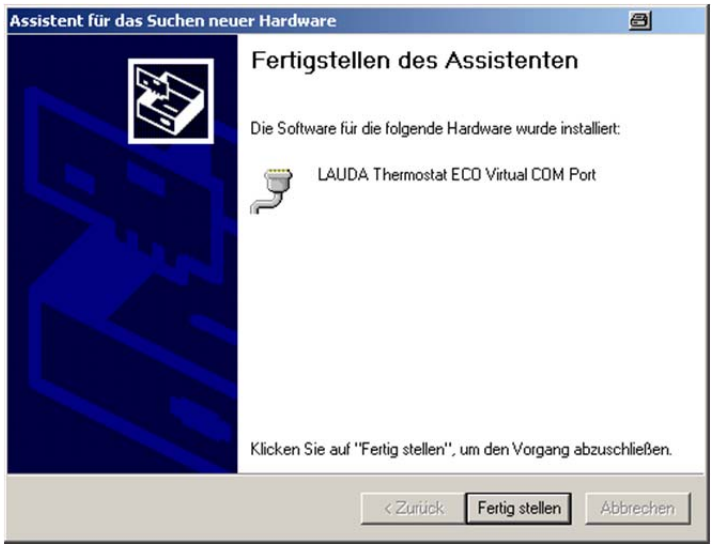
4. Key Continue


Assistent für das Suchen neuer Hardware
Die Software wird installiert...
LAUDA Thermostat ECO Virtual COM Port
< Zurück
Weiter >
Abbrechen

This window is covered by the following window "Hardware installation" (see below).

Hardwareinstallation
Die Software, die für diese Hardware installiert wird:
LAUDA Thermostat ECO Virtual COM Port
hat den Windows-Logo-Test nicht bestanden, der die Kompatibilität mit Windows XP überprüft. (Warum ist dieser Test wichtig?)
Das Fortsetzen der Installation dieser Software kann die korrekte Funktion des Systems direkt oder in Zukunft beeinträchtigen. Microsoft empfiehlt strengstens, die Installation jetzt abzubrechen und sich mit dem Hardwarehersteller für Software, die den Windows-Logo-Test bestanden hat, in Verbindung zu setzen.
Installation fortsetzen
Installation abbrechen

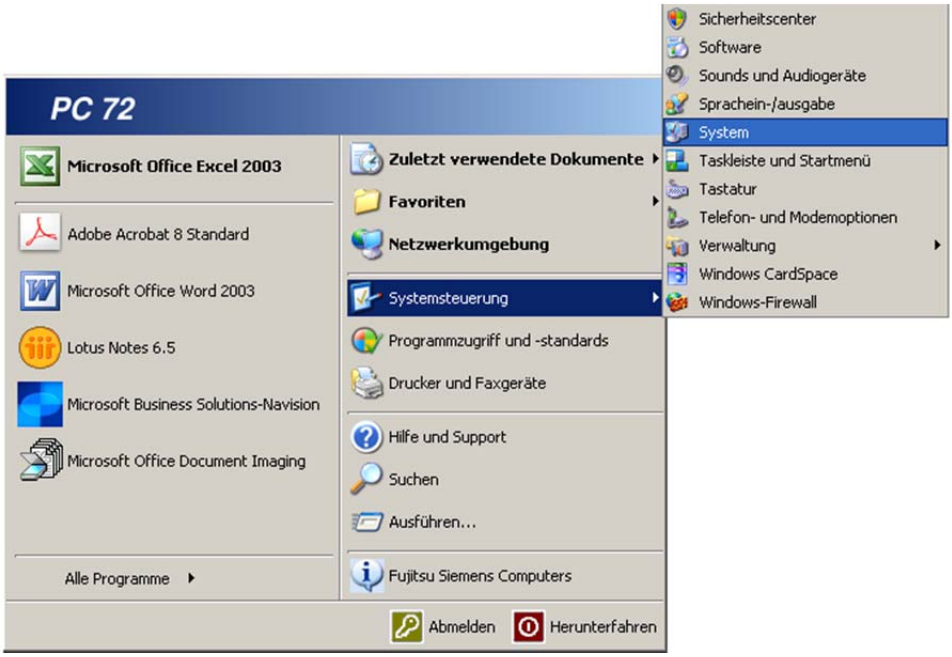
5. Click on Continue installation

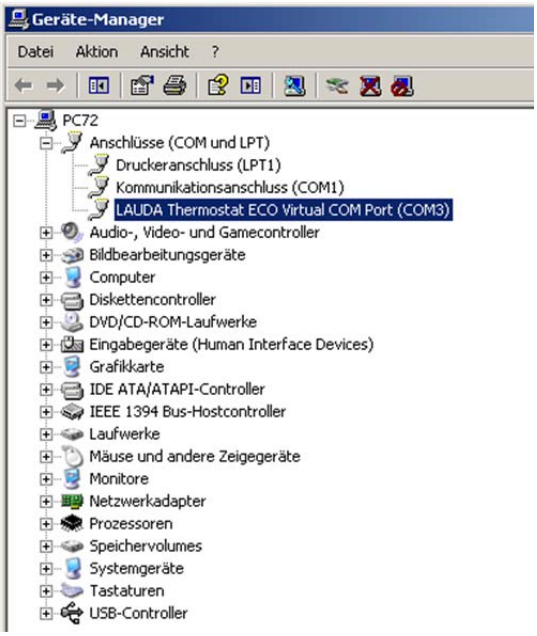

Assistent für das Suchen neuer Hardware
Fertigstellen des Assistenten
Die Software für die folgende Hardware wurde installiert:
LAUDA Thermostat ECO Virtual COM Port
Klicken Sie auf "Fertig stellen", um den Vorgang abzuschließen.
< Zurück
Fertig stellen
Abbrechen

6. Click on the key Finish

### 17.4.4 Where is the ECO Virtual COM Port?

The thermostat can be operated via conventional communication programs (e.g. Hyperterminal) as a COM port. Further settings, such as baud rate, are not needed.






Click on the tab with the mouse and then on the Device manager

## 17.5 Commands and error messages applicable to the RS 232/485 interface module and the USB interface

#### 17.5.1.1 Interface write commands (data issued to the thermostat)

| Command | Meaning |
|---|---|
| OUT_PV_05_XXX.XX | Specify external temperature via interface |
| OUT_SP_00_XXX.XX | Set-value transfer with max. 3 places before the decimal point and max. 2 places after it. |
| OUT_SP_01_XXX | Pump power level 1 to 6 |
| OUT_SP_02_XXX | Cooling operating mode (0 = OFF / 1 = ON / 2 = AUTOMATIC). |
| OUT_SP_04_XXX | TiH outflow temperature limit, upper value |
| OUT_SP_05_XXX | TiL outflow temperature limit, lower value |
| | |
| OUT_PAR_00_XXX.X | Setting of the control parameter Xp. |
| OUT_PAR_01_XXX | Setting of the control parameter Tn (5...180 s; 181 = Off). |
| OUT_PAR_02_XXX | Setting of the control parameter Tv. |
| OUT_PAR_03_XX.X | Setting of the control parameter Td. |
| OUT_PAR_04_XX.XX | Setting of the control parameter KpE. |
| OUT_PAR_05_XXXX | Setting of the control parameter TnE (0...9000 s; 9001 = Off). |
| OUT_PAR_06_XXXX | Setting of the control parameter TvE (5 = OFF). |
| OUT_PAR_07_XXXX.X | Setting of the control parameter TdE |
| OUT_PAR_09_XXX.X | Setting of the max. correction limitation. |
| OUT_PAR_10_XX.X | Setting of the control parameter XpF. |
| OUT_PAR_14_XXX.X | Setting of the setpoint offset. |
| OUT_PAR_15_XXX | Setting of the control parameter PropE. |
| | |
| OUT_MODE_00_X | Keypad: 0 = released / 1 = locked (corresponds to: "KEY"). |
| OUT_MODE_01_X | Control: 0 = int. / 1 = ext. Pt100 / 2 = ext. Analog / 3 = ext. Serial. |
| OUT_MODE_03_X | Keypad remote control unit Command: 0 = released / 1 = locked. |
| OUT_MODE_04_X | Setpoint offset source: 0=normal / 1=ext. Pt / 2=ext. analog / 3=ext. serial. |
| | |
| START | Switches the device on (from Standby) |
| STOP | Switches the device in Standby (pump, heating, chiller off). |
| | |
| RMP_SELECT_X | Selection of program (1...5) to which further commands are to refer. When the device is switched on Program 5 is selected. |
| RMP_START | Start the programmer. |
| RMP_PAUSE | Stop the programmer. |
| RMP_CONT | Start the programmer again after a hold. |
| RMP_STOP | Terminate the program. |
| RMP_RESET | Delete program (all segments) |
| RMP_OUT_00_XXX.XX_XXXXX_XXX.XX_X | Sets programmer segment (temperature, time, tolerance, and pump level). A segment is appended and assigned appropriate values. |
| RMP_OUT_02_XXX | Number of program loops: 0 = endless / 1...250. |

☞ For ”_“, ” ” (space character) is also admissible.

Response from thermostat "OK" or with an error " ERR_X“ (RS 485 interface e.g. “A015_OK” or with an error ”A015_ERR_X”).

**Admissible data formats:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| -XXXX.XX | -XXXX.X | -XXXX. | -XXXX | XXXX.XX | XXXX.X | XXXX. | XXXX |
| -XXX.XX | -XXX.X | -XXX. | -XXX | XXX.XX | XXX.X | XXX. | XXX |
| -XX.XX | -XX.X | -XX. | -XX | XX.XX | XX.X | XX. | XX |
| -X.XX | -X.X | -X. | -X | X.XX | X.X | X. | X |
| -.XX | -.X | .XX | .X | | | | |

### 17.5.2 Interface read commands (data request from the thermostat)

| Command | Meaning |
|---|---|
| IN_PV_00 | Interrogation of bath temperature (outflow temperature) |
| IN_PV_01 | Interrogation of controlled temperature (int./ext., Pt/ext., Analog/ ext. serial). |
| IN_PV_03 | Interrogation of external temperature TE (Pt100). |
| IN_PV_04 | Interrogation of external temperature TE (Analog Input). |
| IN_PV_10 | Interrogation of bath temperature (outflow temperature) **in 0.0001°C**. |
| IN_PV_13 | Interrogation of external temperature TE (Pt100) **in 0.0001°C**. |
| | |
| IN_SP_00 | Interrogation of temperature set value. |
| IN_SP_01 | Interrogation of pump power level. |
| IN_SP_02 | Interrogation of cooling mode (0 = OFF / 1 = ON / 2 = AUTOMATIC). |
| IN_SP_03 | Interrogation of overtemperature switch-off point. |
| IN_SP_04 | Interrogation of outflow temperature limit TiH. |
| IN_SP_05 | Interrogation of outflow temperature limit TiL. |
| | |
| IN_PAR_00 | Interrogation of the control parameter Xp. |
| IN_PAR_01 | Interrogation of the control parameter Tn (181 = OFF). |
| IN_PAR_02 | Interrogation of the control parameter Tv. |
| IN_PAR_03 | Interrogation of the control parameter Td. |
| IN_PAR_04 | Interrogation of the control parameter KpE. |
| IN_PAR_05 | Interrogation of the control parameter TnE (response: XXXX; 9001 = OFF). |
| IN_PAR_06 | Interrogation of the control parameter TvE (response: XXXX; 5 = OFF). |
| IN_PAR_07 | Interrogation of the control parameter TdE (response: XXXX.X). |
| IN_PAR_09 | Interrogation of the max. correction limitation. |
| IN_PAR_10 | Interrogation of the control parameter XpF. |
| IN_PAR_14 | Interrogation of setpoint offset. |
| IN_PAR_15 | Interrogation of the control parameter PropE. |
| | |
| IN_DI_01 | Status of Contact Input 1: 0 = open/ 1 = closed. |
| IN_DI_02 | Status of Contact Input 2: 0 = open/ 1 = closed. |
| IN_DI_03 | Status of Contact Input 3: 0 = open/ 1 = closed. |
| | |
| IN_DO_01 | Status of Contact Output 1:<br>0 = NO contact open/ 1 = NO contact closed. |
| IN_DO_02 | Status of Contact Output 2:<br>0 = NO contact open/ 1 = NO contact closed. |
| IN_DO_03 | Status of Contact Output 3:<br>0 = NO contact open/ 1 = NO contact closed. |

| Command | Meaning |
|---|---|
| IN_MODE_00 | Keypad: 0 = released / 1 = locked. |
| IN_MODE_01 | Control: 0 = int. / 1 = ext. Pt100 / 2 = ext. Analog / 3 = ext. Serial. |
| IN_MODE_02 | Standby operation: 0 = Device ON / 1 = Device OFF. |
| IN_MODE_03 | Keypad remote control unit Command: 0 = released / 1 = locked. |
| IN_MODE_04 | Setpoint offset source: 0 = normal / 1 = ext. Pt / 2 = ext. Analog / 3 = ext. Serial. |
| | |
| TYPE | Interrogation of the device type (response = "ECO"). |
| VERSION_R | Interrogation of the software version number of the control system. |
| VERSION_S | Interrogation of the software version number of the protection system. |
| VERSION_B | Interrogation of the software version number of the Command remote control |
| VERSION_T | Interrogation of the software version number of the cooling system. |
| VERSION_A | Interrogation of the software version number of the analog module. |
| VERSION_V | Interrogation of the software version number of the RS232/485 module. |
| VERSION_D | Interrogation of the software version number of the digital module. |
| VERSION_M_0 | Interrogation of the software version number of the solenoid valve (cooling water). |
| VERSION_M_3 | Interrogation of the software version number of the solenoid valve (shut-off valve 1). |
| VERSION_M_4 | Interrogation of the software version number of the solenoid valve (shut-off valve 2). |
| VERSION_M_5 | Interrogation of the software version number of the high temperature cooler. |
| VERSION_E | Interrogation of the software version number of the external Pt100 module. |
| STATUS | Interrogation of the device status 0 = OK, -1 = Error. |
| STAT | Interrogation of the error diagnosis response:<br>XXXXXXX → X = 0 no error, X = 1 error<br>1st character = Error<br>2nd character = Alarm<br>3rd character = Warning<br>4th character = Overtemperature<br>5th character = Low Level<br>6th character = 0<br>7th character = External control value missing |
| | |
| RMP_IN_00_XXX | Interrogation of a program segment XXX response:<br>(e.g. 030.00_00010.00_005.00_001.00 => Set-point temperature = 30.00 °C, Time = 10 min, Tolerance = 5,00 °C, Pump stage = 1). |
| RMP_IN_01 | Interrogation of the current segment number. |
| RMP_IN_02 | Interrogation of the set program loops. |
| RMP_IN_03 | Interrogation of the current program loops. |
| RMP_IN_04 | Interrogation of to which program further commands refer. |
| RMP_IN_05 | Interrogation of which program is currently running (0 = none). |

**Note:**

For ”_“, ” ” (space character) is also admissible.

Unless otherwise stated with the command, the response from the thermostat is always in the fixed-point format "XXX.XX" or "-XXX.XX" for negative values or "ERR_X". (RS 485 interface e.g. ”A015_ XXX.XX” or ”A015_-XXX.XX” or ”A015_ERR_X”).

### 17.5.3 Interface error messages

| Error | Meaning |
|---|---|
| ERR_2 | Incorrect entry (e.g. buffer overflow) |
| ERR_3 | Wrong command. |
| ERR_5 | Syntax error in the value. |
| ERR_6 | Impermissible value. |
| ERR_8 | Module or value not present. |
| ERR_30 | Programmer, all segments occupied. |
| ERR_31 | No setpoint input possible |
| ERR_33 | External probe missing. |
| ERR_34 | Analog value not present. |

### 17.5.4 Driver software for LABVIEW®

With the aid of the program development tool LABVIEW® from National Instruments (http://sine.ni.com/apps/we/nioc.vp?cid=1381&lang=US) an easy-to-use individual control or automation software program can be produced for operating ECO devices. In order to be able to address from the program the RS 232/485 interface that is used LAUDA makes the drivers specially produced for LABVIEW® available free of charge for download at http://www.lauda.de.

## 17.6 Contact module

### 17.6.1 Contact module LRZ 914 with 1 input and 1 output

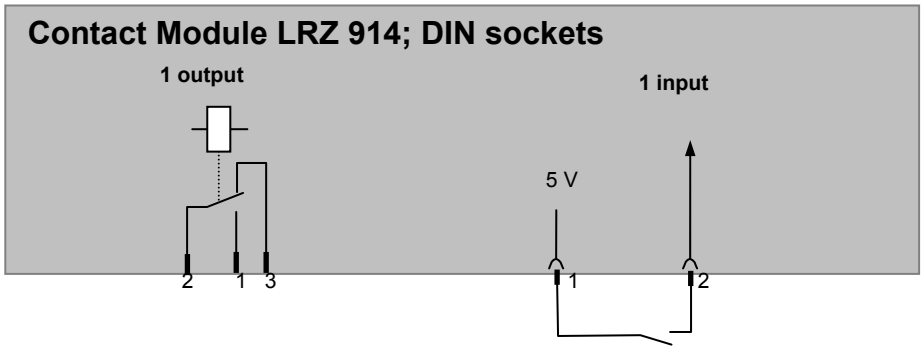
Contact module (order no. LRZ 914) with connectors to NAMUR NE28, with 1 output and 1 input on each of 2 DIN sockets.

The inputs provide the following functions:

| | |
|---|---|
| Error | Set error |
| Standby | Set standby |
| Control programmer | Control programmer (Input 1 activates the programmer. The programmer is started on the first "closed" and is put into "hold" on "open". The next "closed" triggers "continue") with the function. |
| Change mode | Control change mode (the switching statuses of contact "open" or "closed" are assigned 2 different set-point temperatures). |
| Control mode | Control the Control mode (the switching statuses of input "open" or "closed" can have 2 different control temperature sources assigned to them, e.g. internal ↔ external control). |

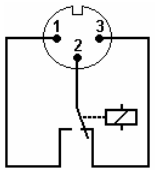
The outputs provide the following functions:

| | |
|---|---|
| Error diagnosis | Signal various error statuses. |
| Standby | Signal standby. |
| Temperature range | Give the status of the actual temperature within a certain range (within ↔ outside). |
| Programmer | Give programmer status. |



**Contact outputs and inputs**

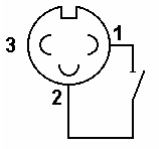
| Output | Input |
|---|---|
| – View of flanged plug (front) or coupling-socket solder side<br>– Max. 30 V; 0.2 A<br><br>Coupling socket order no. EQD 047 | – View of socket (front) or solder side of plug<br>– Signal approx. 5 V, 10 mA, do not assign Contact 3.<br>Coupling plug order no. EQS 048 |




1 = NO contact

2 = Center contact

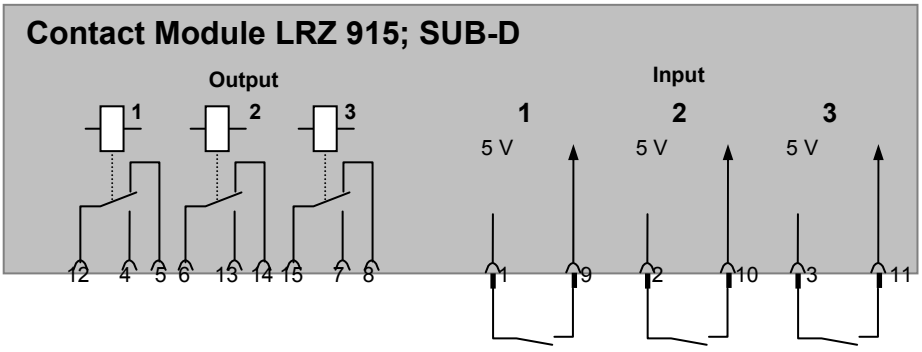
3 = NC contact



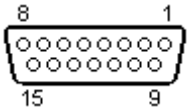

**Note:**
Only use screened connecting leads and connects the screen to the plug housing. Cover unused connectors with protective caps.

### 17.6.2 Contact module LRZ 915 with 3 inputs and 3 outputs

Contact module (order no. LRZ 915) with 15-pole SUB-D socket. Range of functions as LRZ 914, but with three relay contact outputs (changeover, max. 30V/0.2A) and three binary inputs for control via external voltage-free contacts.




**Contact inputs and outputs**




View of sockets on the plug side or of sockets on the solder side.

A suitable 15-pole Sub-D plug can be obtained together with a suitable housing under order no. EQM 030 (plug case order no. EQG 017).

## BESTÄTIGUNG / CONFIRMATION / CONFIRMATION

**An / To / A:**
LAUDA Dr. R. Wobser • LAUDA Service Center • Fax: +49 (0) 9343 - 503-222

**Von / From / De :**

Firma / Company / Entreprise: _____

Straße / Street / Rue: _____

Ort / City / Ville: _____

Tel.: _____

Fax: _____

Betreiber / Responsible person / Personne responsable: _____

Hiermit bestätigen wir, daß nachfolgend aufgeführtes LAUDA-Gerät (Daten vom Typenschild):
We herewith confirm that the following LAUDA-equipment (see label):
Par la présente nous confirmons que l'appareil LAUDA (voir plaque signalétique):

| **Typ / Type / Type :** | **Serien-Nr. / Serial no. / No. de série:** |
|---|---|
| | |

mit folgendem Medium betrieben wurde
was used with the below mentioned media
a été utilisé avec le liquide suivant

_____

_____

_____

_____

**Darüber hinaus bestätigen wir, daß das oben aufgeführte Gerät sorgfältig gereinigt wurde, die Anschlüsse verschlossen sind, und sich weder giftige, aggressive, radioaktive noch andere gefährliche Medien in dem Gerät befinden.**

**Additionally we confirm that the above mentioned equipment has been cleaned, that all connectors are closed and that there are no poisonous, aggressive, radioactive or other dangerous media inside the equipment.**

**D'autre part, nous confirmons que l'appareil mentionné ci-dessus a été nettoyé correctement, que les tubulures sont fermées et qu'il n'y a aucun produit toxique, agressif, radioactif ou autre produit nocif ou dangeureux dans la cuve.**

| **Stempel**<br>**Seal / Cachet.** | **Datum**<br>**Date / Date** | **Betreiber**<br>**Responsible person / Personne responsable** |
|---|---|---|
| | | |

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